FINAL REPORT

Lenz Oil Settling Respondents

Remedial Investigation Report
Lenz Oil Service, Inc. Site
Lemont, Illinois

Volume 1 of 6

Revision 1

October 1992

Project No. 0252

Environmental Resources Management-North Central, Inc.
540 Lake Cook Road, Suite 300
Deerfield, Illinois 60015

ERM

ENVIRONMENTAL RESOURCES MANAGEMENT GROUP

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EXECUTIVE SUMMARY

The Remedial Investigation (RI) of the Lenz Oil Service, Inc. (Lenz Oil) site was conducted as part of the Remedial Investigation/Feasibility Study (RI/FS) implemented by the Lenz Oil Participating Respondents in accordance with the 1989 Administrative Order by Consent between the Lenz Oil Participating Respondents and the U.S. Environmental Protection Agency (USEPA). Environmental Resources Management-North Central, Inc. (ERM-North Central) was retained by the Participating Respondents to conduct all of the RI/FS activities except the soil, surface water, and sediment investigations and the Baseline Risk Assessment. The soil, surface water, and sediment investigations were performed by the Illinois Environmental Protection Agency (IEPA) and EBASCO Services, Inc. on behalf of the IEPA. The Baseline Risk Assessment was prepared by PRC Environmental Management, Inc. on behalf of the USEPA.

The RI was performed to gather and present sufficient information to support an informed risk management decision regarding the selection of the most appropriate site remedy. The specific objectives of this RI were to: (1) determine the physical characteristics of the site, (2) evaluate the nature and extent of contamination, and (3) assess the associated current and potential future environmental and human health risks. The data from this RI will be used to identify and evaluate potential remedial alternatives for the site.

SITE BACKGROUND

The Lenz Oil site, which is situated on 4.9 acres of land, is located northeast of the intersection of Illinois Route 83 and Jeans Road in southeastern DuPage County, Illinois. In 1961, Mr. Winston Lenz established Lenz Oil, a small business that collected waste oils, temporarily stored the wastes in tanks on the site, and then shipped the wastes to local recycling facilities. Lenz Oil also supplied oils and construction materials for roadwork projects. Between April 1961 and December 1980, the waste oil operation was expanded to include waste solvents. In 1980, Mr. Charles Russell purchased Lenz Oil and took over operations at the facility.

In April 1985, the IEPA referred a law suit to the Illinois Attorney General's office alleging the mismanagement of hazardous waste at the Lenz Oil facility. Numerous permit violations involving: (1) manifest infractions, (2) inadequate waste handling practices, and (3) reported releases of hazardous wastes to the local ground water and surface water systems were the basis of the law suit against Lenz Oil and Mr. Russell. An order, agreed upon by the parties, required Lenz Oil and Mr. Russell to initiate immediate clean-up actions and to file a closure and compliance plan. Although Mr. Russell complied with parts of the order, the IEPA found that the facility was in general disarray and appeared to be abandoned during an inspection of the facility in November of 1985. The IEPA prepared a Record of Decision for the remedial action required at the Lenz Oil site, which was filed on January 17, 1986 and amended on January 15, 1987. In April 1986, Mr. Russell filed for bankruptcy and completely abandoned the facility.

Between April and November 1986, the IEPA and its contractors investigated the Lenz Oil site. Their investigations included: (1) inventorying and sampling the drums, tanks, and tank trucks; (2) surveying the site with a magnetometer and metal detector; (3)

collecting soil samples and analyzing them for contamination; (4) installing monitoring wells to evaluate the hydrogeology and assess the ground water contamination; (5) blanketing potentially explosive storage tanks with nitrogen; and (6) setting berms to reduce off-site drainage.

Based on the results of these investigations, the IEPA instituted the following emergency remedial action activities: (1) the incineration of all drum, tank, and tank truck contents; (2) the shredding and incineration of all drums, and the decontamination of all tanks and tank trucks; (3) the removal of all aboveground and underground structures; (4) the excavation and incineration of the soil in the vicinity of the underground storage tank farms and in hot spots in the area of the former surface impoundments; and (5) the installation of municipal water connections for all of the residences formerly using private wells in the immediate vicinity of the site. The IEPA also lined the main excavation area with visqueen and backfilled it with incinerator ash; however, the hot spot excavation areas were not lined but were backfilled with clean material.

In October 1984, the IEPA identified the Lenz Oil site as a potential hazardous waste site to the USEPA in the form of a Preliminary Assessment. In October 1987, the USEPA assigned the site a hazard ranking score of 42.33. The Lenz Oil site was finalized on the National Priority List in September 1989, and the USEPA and the Lenz Oil Participating Respondents signed an Administrative Order by Consent to perform an RI/FS at the site in November 1989. The Lenz Oil RI/FS began with the submittal of Draft RI/FS Work Plan in January 1990. The RI was performed between January 1991 and October 1992.

REMEDIAL INVESTIGATION TASKS

Information regarding the operational, regulatory, and ownership history of the Lenz Oil site was obtained from the USEPA, IEPA, and Participating Respondents, and from an analysis of historical aerial photographs of the site. These data were used to identify and characterize the primary sources of on-site contamination, and to develop a preliminary conceptual model for the release and transport of contamination from the site. Potential receptors of contamination from the site were identified by performing surface water and ground water usage surveys; determining the extent of the human population in the vicinity of the site; and evaluating the occurrence of floodplains, wetlands and threatened/endangered species in the vicinity of the site.

The physical characteristics of the site were determined by collecting regional and site-specific data regarding topography, physiography, meteorology, soils, geology, surface water hydrology, ground water hydrology, and ecology. These data were collected by performing: (1) a literature search, (2) a boundary and topographic survey, (3) ecological and surface feature field inspections, (4) soil boring drilling and sampling, (5) the installation of monitoring wells and stream gages, (6) the measurement of water levels, and (7) hydraulic conductivity testing of the aquifer. The nature and extent of contamination at the site were determined by evaluating the laboratory analytical results from the soil, soil gas, ground water, nonaqueous phase liquid (NAPL), surface water, and sediment samples collected from the site and adjacent properties. The potential fate and transport of the contaminants detected at the Lenz Oil site were determined based on the physical characteristics, the nature and extent of contamination, and the physical and chemical properties of the contaminants in the area of the investigation. A Baseline Risk Assessment was performed to evaluate the potential risk to human health and the environment posed by the contamination at the Lenz Oil site.

PHYSICAL CHARACTERISTICS OF THE STUDY AREA

The Lenz Oil site and most of the surrounding area are either idle and undeveloped or used for commercial, light industrial, or residential purposes. The site itself is currently vacant and idle. Several notable features outside the immediate vicinity of the Lenz Oil site include the Argonne National Laboratory reservation, a former low-level radioactive waste disposal area, a large forest preserve, and several large industrial complexes situated along the Des Plaines River.

The Lenz Oil site is located on the floodplain of the Des Plaines River, and is situated at the base of a 75-foot bluff that defines the northern boundary of the Des Plaines River Valley. The river valley is relatively smooth and flat compared to the uplands adjacent to the Lenz Oil site. The Des Plaines River is located approximately 600 feet southeast of the site, and the Chicago Sanitary and Ship Canal is an additional 800 feet beyond the Des Plaines River. On the northern side of the river, the regional slope is toward the southeast (i.e., toward the river); however, the site topography generally slopes toward the north and northwest. Surface water runoff from the Lenz Oil site either infiltrates the on-site soil or flows to a small intermittent drainage ditch that is situated along the northwestern border of the site. Surface water in the drainage ditch flows to the west and appears to pond on an auto wrecking facility west of Illinois Route 83. Under high flow conditions, the water in the drainage ditch eventually discharges to the Des Plaines River.

The shallow geology of the Lenz Oil site consists of Silurian dolomitic bedrock overlain by unconsolidated Quaternary glacial and alluvial deposits and fill materials. The bedrock is part of the Racine Dolomite Formation, which is comprised of dolomite with several discrete fracture zones. most of which are horizontal and appear to be bedding planes. The surface of the dolomitic bedrock is irregular and varies as much as 16 feet in elevation over the site.

The dolomitic bedrock is overlain by up to 26.5 feet of unconsolidated deposits, including a silty dolomitic gravel with varying amounts of sand and clay which is in turn overlain by 3 to 13 feet of mottled silt and silty clay with a trace of pebbles. Compacted backfill composed of only slightly permeable silty sand and gravelly clay is limited to the area adjacent to Illinois Route 83. The material used to backfill the main excavation area of the Lenz Oil site consists of dark-brown to black sand, gravel, and incinerator ash. The main excavation area is situated in the west-central portion of the site, extends down to the bedrock (i.e., approximately 12 feet), and is separated from the bedrock by a visqueen liner.

The principal sources of ground water in the vicinity of the Lenz Oil site are the shallow glacial drift and the Silurian dolomite aquifers, which are generally interconnected. The surficial aquifer at the Lenz Oil site is composed of Silurian dolomite and unconsolidated deposits that are hydraulically interconnected and together form a single unconfined aquifer, except for a small area along Illinois Route 83. The saturated thickness of the unconsolidated deposits varies from less than 1 foot to over 20 feet, and the horizontal hydraulic conductivity of these deposits varies from 178 to 4,102.5 gpd/ft^2. The bedrock portion of the surficial aquifer consists of Silurian dolomite characterized by solution-enlarged vertical and horizontal fractures. The horizontal hydraulic conductivity of the fractured dolomite ranges from 12 to 819 gpd/ft^2. The ground water below the site flows to the south and southeast, where it discharges into the Des Plaines River. The average horizontal hydraulic gradient at the water table is approximately 0.0035 ft/ft toward the southeast. Although the ground water below the site has a downward vertical flow gradient of -0.0077 to -0.0081 ft/ft, the ground water has an upward vertical flow gradient near the Des Plaines River. As a result, the aquifer is recharged by precipitation at the site and discharges to the Des Plaines River downgradient of the site.

Based on our review of well construction logs, a total of 310 residential, commercial, and industrial wells are located within approximately two miles of the Lenz Oil site. The majority of these wells (i.e., 303) are completed in the Silurian dolomite aquifer and the remaining seven are screened in the glacial drift aquifer. Most of the private wells in the vicinity of the site are completed in the upper 60 feet of the Silurian dolomite. Because the IEPA provided municipal water connections to all of the residences in the vicinity of the site as part of their remedial activities, none of these residences use private wells for potable water.

An assessment of water usage for a 2-mile stretch of the Des Plaines River downstream of the Lenz Oil site failed to identify any facilities that use water from the Des Plaines River, the Chicago Sanitary and Ship Canal, or the Illinois and Michigan Canal for drinking water purposes. However, several industries in the area obtain process water from the Chicago Sanitary and Ship Canal. Several wetlands are located within a 1-mile radius of the site (i.e., within the Des Plaines River Valley), and all of these wetlands appear to be perched above isolated layers of impermeable soil material. No Federal- or State-listed endangered/threatened species have been documented in the immediate vicinity of the site.

NATURE AND EXTENT OF CONTAMINATION

The primary source(s) of contamination at the site were the contents (i.e., waste oils and solvents) of the drums, tanks, tank trucks, and surface impoundments that were present during the operation of the Lenz Oil facility. Although these primary sources of contamination were incinerated as part of the IEPA's remedial activities, some of the waste oils and solvents had already been released to the environment (i.e., spilled or leaked from their storage vessels) during the 20 years that Lenz Oil operated at the site.

Previous investigations by the IEPA showed that the on-site soil contained elevated concentrations of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and some metals. Although the IEPA excavated and incinerated the soil in the vicinity of the former tank farms and in hot spots near the former surface impoundments, confirmatory soil sampling performed during this RI indicates the continued presence of residual soil contamination at the site. The analytical results for the surface and subsurface soil samples collected from outside the excavation areas show that the soil is contaminated from the ground surface to the water table with Target Compound List (TCL) VOCs, SVOCs, polychlorinated biphenyls (PCBs), and pesticides; some VOC and SVOC Tentatively Identified Compounds (TICs); some Target Analyte List (TAL) metals; and cyanide. A large percentage of the VOC and SVOC contamination detected in the soil samples is comprised of unknown TICs. With the exception of one hot spot located near the northwestern corner of the main excavation area, the total VOC concentrations detected in the on-site soil were less than 5 mg/kg. (During the remedial activities conducted by the IEPA, the Agency used 5 mg/kg of total VOCs to identify soil to be excavated and incinerated.) While the residual soil contamination outside of the main excavation area is inconsistently distributed, higher concentrations of organic compounds were detected along the periphery of the main excavation area and in the vicinity of the former surface impoundments, and lower organic compound concentrations were found along the northeastern side of the site.

Based on the soil sampling conducted within the former excavation areas, the excavation backfill is not hazardous by characteristic, but it does contain elevated concentrations of some TAL metals. The excavation backfill also contains some TCL VOCs and SVOCs, as well as some VOC and SVOC TICs, particularly at depths greater than 5 feet below the ground surface. Although this organic contamination may consist of residuals from the IEPA's source control remedial activities, it may also have been caused by the reinfiltration of contaminated NAPL and ground water, or by the migration of contaminants from the soil that was not excavated in the vicinity of the G105 monitoring well cluster.

Sediment samples obtained from the drainage ditch located along the northwestern border of the site contained TCL VOCs, TCL SVOCs, TAL metals and cyanide, as well as various VOC and SVOC TICs. The sediment sample collected upstream of the site contained many of the same organic and inorganic contaminants detected in the samples from locations adjacent to and downstream of the site. However, the types and concentrations of TCL organic compounds detected in the sediment samples generally increased in the downstream direction. The surface water samples collected from the drainage ditch contained some organic (i.e., TCL VOCs and SVOCs as well as VOC and SVOC TICs) and inorganic (i.e., TAL total metals) contamination that may be attributable to the Lenz Oil site. However, the presence of other contaminant sources upstream and downstream of the site makes it impossible to determine the extent of any site-related surface water or sediment contamination in the drainage ditch.

A black, oily NAPL was discovered on the ground water table below and downgradient of the Lenz Oil site. If the NAPL is continuous between the wells in which it is observed, it covers an area of approximately 91,000 square feet in the south-central portion of the site. However, the extent of the NAPL may be much smaller because the lined main excavation area is situated between the wells that contain NAPL and the NAPL may have been removed during the IEPA's incineration program. The average apparent thickness of the NAPL in the monitoring wells is 0.87 feet. Because the actual thickness of a NAPL may be 10 to 100 percent of the apparent thickness observed in a well, the actual average thickness of the NAPL below the Lenz Oil site may range from 0.087 to 0.87 feet. Samples of the NAPL contained high concentrations of several TCL VOCs, SVOCs, and PCBs, as well as elevated concentrations of several TAL metals. The organic contaminants detected include aromatics, ketones, polynuclear aromatic hydrocarbons (PNAs), phthalates, PCBs, and a variety of TICs. Chlorinated solvents may also be present in the NAPL, but were not detected because of the high detection limits. The inorganic constituents found at elevated concentrations in the NAPL include arsenic, barium, cadmium, chromium, copper, iron, lead, nickel, selenium, and zinc. Based on the results of the Toxicity Characteristic Leaching Procedure (TCLP) analyses, the NAPL contains hazardous constituents and is considered hazardous by characteristic.

The analytical results from the monitoring well samples show that the surficial aquifer below and downgradient of the site contained TCL VOCs, SVOCs, and PCBs; VOC and SVOC TICs; as well as elevated concentrations of several TAL metals and cyanide. The detected TCL organic contaminants include chlorinated solvents, aromatics, PNAs, phthalates, and PCBs. The VOC and SVOC TICs present in the ground water are typical constituents and degradation products of oils and solvents. The PCBs were found only in the ground water samples taken directly beneath the NAPL and their presence may be residual NAPL rather than ground water. The inorganic analytes found in the ground water at elevated concentrations relative to the concentrations detected in the ground water samples from the upgradient monitoring wells include aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, vanadium zinc, and cyanide. The diversity and concentrations of these organic and inorganic constituents generally decrease with depth in the aquifer and with distance from the site.

The approximate vertical extent of the ground water contamination below and downgradient of the site is based on the contaminant concentrations detected in the samples from the deep monitoring wells (i.e., MW-1D, MW-2D, MW-3D, MW-4D, MW-5D, MW-6D, MW-7D, G101D, and G106DR). Although the ground water samples from all of these wells contained organic and inorganic constituents, most of the constituents were organic TICs and naturally-occurring metals. The ground water samples from five of the nine deep monitoring wells (i.e., MW-1D, MW-4D, MW-5D, MW-6D, and MW-7D) contained no TCL organic compounds, and with the exception of the samples from G106DR, none of the deep monitoring well samples contained individual TCL organics at concentrations greater than 3 ug/L. The samples from G106DR contained chloroethane, toluene, and benzene at maximum concentrations of 53 ug/L, 4 J ug/L, and 10 ug/L, respectively. The benzene concentration in the Round 2 sample from G106DR is the only contaminant concentration from a deep monitoring well sample that exceeds its MCL (i.e., 5 ug/L). Although elevated concentrations (relative to the concentrations in the deep upgradient well samples) of several TAL metals were present in all of the deep monitoring well samples, none of the metals were found at concentrations above their MCLs.

The approximate lateral extent of the ground water contamination below and downgradient of the site is based on the contaminant concentrations detected in the samples from the monitoring wells situated at the perimeter of the monitoring well network (i.e., MW-1S, MW-1D, MW-2S, MW-2D, MW-3S, MW-3D, MW-6S, MW-6D, MW-7S, MW-7D, MW-8S, G101M, G101L, G101D, G104L, and G104D). Although organic and inorganic constituents were found in the ground water samples from all of these monitoring wells, the constituents detected were predominantly organic TICs and naturally-occurring metals. The ground water samples from 10 of the 16 perimeter monitoring wells contained no TCL organic compounds, and none of the perimeter monitoring well samples contained individual TCL organics at concentrations greater than 4 ug/L. Further, none of the organic constituents found in the perimeter well samples were at concentrations above their MCLs. Total VOC and SVOC TICs were present in monitoring wells MW-1S, MW-2D, MW-3S, MW-7S, and MW-8S at concentrations greater than 50 ug/L. Although elevated concentrations (relative to the concentrations in the upgradient well samples) of several TAL metals were found in all of the perimeter monitoring wells, the only constituents at concentrations above their MCLs were chromium in MW-1S and MW-2S, and lead in MW-1S, MW-2S and MW-8S.

The existing monitoring well network does not extend beyond the detectable limit of the ground water contamination below and downgradient of the Lenz Oil site. However, the nature and extent of the ground water contamination has been sufficiently defined by the sample results from the existing monitoring wells to support an informed risk management decision regarding the selection of the most appropriate site remedy.

CONTAMINANT FATE AND TRANSPORT

The potential routes of contaminant migration from the Lenz Oil site include the soil, surface water and sediment, NAPL, ground water, and air pathways. All of these pathways, except the air pathway, were investigated during this RI and each of the investigated pathways contained some amount of organic and inorganic contamination. The contamination in the soil will persist in that matrix or potentially migrate to the air, NAPL, ground water, or surface water and sediment pathways. The contaminants that migrate via the surface water and sediment pathway in the drainage ditch located northwest of the site will be transported downstream until they settle out or infiltrate the soil along the route of migration. Similarly, contamination in the NAPL will persist or partition to the ground water. Based on the K_{ow} values for the contaminants detected in the NAPL, very low concentrations of contamination will partition from the NAPL into the ground water. Therefore, most of the contamination in the NAPL will persist in that phase. The contamination from the NAPL or soil that dissolves into the ground water will migrate in the ground water, which flows toward the Des Plaines River. The ultimate fate of all of the contaminants detected at the Lenz Oil site is either transformation into another chemical species or persistence in one of the following media: soil, surface water, sediment, NAPL, ground water, air, or biota.

BASELINE RISK ASSESSMENT

A Baseline Risk Assessment of the Lenz Oil site was conducted by PRC Environmental Management, Inc. on behalf of the USEPA to characterize the potential risks to human health and to the environment caused by contaminants at the site. The Baseline Risk Assessment Report, included as Appendix A of this RI Report, contains a separate Executive Summary.

1.0 INTRODUCTION

1.1 Purpose of Report

This Remedial Investigation (RI) Report for the Lenz Oil Service, Inc. (Lenz Oil) site is being submitted on behalf of the Lenz Oil Participating Respondents to the U.S. Environmental Protection Agency (USEPA) in accordance with Article IX, Part A of the Administrative Order by Consent (USEPA, 1989a) and Section 5.5.3 of the Lenz Oil site Remedial Investigation/Feasibility Study (RI/FS) Work Plan (ERM-North Central, 1990a).

Environmental Resources Management-North Central, Inc. (ERM-North Central) was retained by the Lenz Oil Participating Respondents to conduct the RI/FS of the Lenz Oil site. In accordance with a contractual agreement between the Illinois Environmental Protection Agency (IEPA) and the Participating Respondents, the IEPA performed the soil, surface water, and sediment investigations for this RI. Specifically, the IEPA is responsible for the sample collection, sample analyses, data validation, data assessment, and reporting associated with these investigations. Sections 2.8, 2.9, 2.10, 4.1, 4.2, 4.3, 5.1.1, and 5.1.2 of this RI report were prepared by EBASCO Services, Inc. (EBASCO) on behalf of the IEPA. At the request of the Participating Respondents, the USEPA performed the Baseline Risk Assessment for the Lenz Oil RI/FS. The USEPA retained PRC Environmental Management, Inc. to prepare the Baseline Risk Assessment Report, which is included as an appendix in this RI Report.

The purpose of the RI was to gather and present sufficient information to support an informed risk management decision regarding the selection of the most appropriate site remedy. During the completion of the RI, data were collected and evaluated to assess the: (1) physical characteristics of the site, (2) nature and extent of contamination, and

(3) associated environmental and human health risks. Data compiled and evaluated during the RI are also being used to conduct the FS for the site, which consists of an assessment of the need for and methods of remediating the site.

This RI Report, which summarizes the results of the RI, is divided into the following seven sections:

- Section 1.0 - indicates the purpose of the report, the scope of the RI, a description of the site, and the site history.

- Section 2.0 - describes the investigative activities and methods used to determine the physical characteristics of the site and the nature and extent of contamination at the site.

- Section 3.0 - presents the physical characteristics of the site and the probable contaminant migration routes.

- Section 4.0 - provides a summary of the analytical results of the soil, ground water, nonaqueous phase liquid (NAPL), surface water, and sediment sampling.

- Section 5.0 - discusses contaminant fate and transport, including potential routes of migration, contaminant persistence, and factors affecting contaminant migration.

- Section 6.0 - was prepared by USEPA and consists of a Baseline Risk Assessment Report, which includes evaluations of exposure, toxicity, and risk characterization, to determine potential effects on human health and the environment. The Baseline Risk Assessment Report is included as Appendix A for ease of presentation; however, it is an integral, required portion of the RI Report.

- Section 7.0 - provides a summary of the nature and extent of contamination, fate and transport, and risk assessment as well as conclusions about the usability of the data.

1.2 Scope of Work

The Scope of Work for the Lenz Oil site RI/FS is outlined in the Consent Order and described in detail in the following Work Plan documents:

- Remedial Investigation/Feasibility Study Work Plan, Lenz Oil Service, Inc., Lemont, Illinois (ERM-North Central, 1990a).

- Phase II Remedial Investigation/Feasibility Study Work Plan - Part A, Lenz Oil Service, Inc., Lemont, Illinois (ERM-North Central, 1991a).

- Draft Phase IIB Work Plan for the Lenz Oil site (EBASCO Services, Inc., 1992a).

The rationale and procedures for conducting the various RI activities and handling the RI data are specified in the following Work Plan companion documents:

- Sampling and Analysis Plan (ERM-North Central, 1990b);
- Quality Assurance Project Plan (ERM-North Central, 1990c);
- Data Management Plan (ERM-North Central, 1990d);
- Health and Safety Plan (ERM-North Central, 1990e); and
- Quality Assurance Project Plan (QAPP) Addendum (ERM-North Central, 1992a).

The USEPA and the IEPA approved the Lenz Oil site RI/FS Work Plan and its companion documents on December 18, 1990 and the Phase II RI/FS Work Plan and its companion documents on January 30, 1992.

The Lenz Oil site RI consisted of three basic tasks:

- Task 1 - Description of Current Situation,
- Task 2 - Site Investigation, and
- Task 3 - Site Investigation Analysis.

The various activities conducted as part of this RI are summarized on Table 1-1. The Task 1 activities included a site boundary survey and the development of a base map, a site grid and topographic survey, an historical aerial photograph analysis, an area ground water usage survey, a review of the history of the site response actions, an evaluation of ground water flow, a regional bedrock fracture analysis, a site background investigation, and an evaluation of the nature and extent of contamination. The results of these Task 1 activities are documented in Technical Memorandum No. 1, which is included as Appendix B. Subcontracting, mobilization of the field support facilities, and a soil gas survey were also completed as part of Task 1. The methods, results, and conclusions of the soil gas survey are presented in Technical Memorandum No. 2, which is included as Appendix C.

Task 2 consisted of performing a site investigation in two phases to characterize the source(s) of contamination at the site and determine the nature, extent, and fate of contamination in the various migration pathways. Phase I included on-site soil sampling, monitoring well installation, site-specific fracture analysis, aquifer characterization, Round One ground water sampling, NAPL sampling, sediment and surface soil sampling, and surface water sampling. A Phase II Work Plan was prepared to identify gaps in the Phase I data and propose investigative activities to satisfy the data gaps and achieve the RI objectives. The Task 2 - Phase II activities included additional on-site soil sampling, surface water resampling, monitoring well installation, Round Two ground water sampling, private well sampling, and NAPL sampling. The methods, results, and conclusions of the Task 2 - Phase I and Phase II activities are documented in this RI Report.

Task 3 consisted of analyzing the data collected during Tasks 1 and 2, and evaluating the: (1) quality and sufficiency of the investigative data, (2) contaminant fate and transport mechanisms, and (3) environmental and human health risks posed by contamination at the site. The methods, results, and conclusions of these analyses are presented in this RI Report. The Baseline Risk Assessment was performed by PRC Environmental Management, Inc. on behalf of the USEPA.

1.3 Site Background

1.3.1 Site Description

The Lenz Oil site is situated northeast of the intersection of Illinois Route 83 and Jeans Road in southeastern DuPage County, Illinois (Figure 1-1). The site is approximately 3.5 miles northeast of the center of Lemont, Illinois, and is located in the southeast 1/4 of Section 11, T37N, R11E of the third principal meridian. The Lenz Oil site is bounded by the Atchison, Topeka, and Santa Fe Railroad to the northwest; Illinois Route 83 to the southwest; Jeans Road to the southeast; and a private residence/small business to the northeast. The site is legally described as follows:

> Lot 3 of Jacob J. Jeans' plat of survey of part of the Southeast quarter of Section 11, Township 37 North, Range 11 East of the third principal meridian, in DuPage County, Illinois, according to the Plat thereof recorded October 7, 1950 as Document 606585, except the part of Lot 3 lying Northeast of a line perpendicular to Jeans Road from a point which is 202.0 feet southeast, as measured along the southeastern line of Lot 3, of the southeastern corner of Lot 3.

The site consists of 4.9 acres of land and has an average elevation of 600 feet above mean sea level (AMSL). A topography map of the Lenz Oil site and the surrounding area is shown on Figure 1-2. The site is currently a flat, vacant, grassy area containing a radio antenna, several monitoring wells, a fire hydrant, two underground manways, a drum storage area, and a contamination reduction zone. A wire fence with two gates extends across the southern edge of the site and approximately 160 feet of the western edge of the site. A wooden fence extends approximately 200 feet along the eastern edge of the property and separates the site property from the neighboring residential property. A plain barbed wire fence extends discontinuously along the northern property boundary, approximately 50 feet south of the railroad tracks to the north.

The Des Plaines River, which trends from the east to the west, is located approximately 550 feet to the south of the property. The river flows to the west and is situated at an elevation of approximately 588 feet AMSL.

1.3.2 Site History

The chronological history of the Lenz Oil site was reconstructed by examining historical aerial photographs, and reviewing documents provided by the USEPA, IEPA, and Lenz Oil Participating Respondents. The aerial photographs (dated 1954, 1961, 1967, 1971, 1974, 1981, and 1988) show the expansion of the facility over time and its status during the IEPA's Emergency Clean-up Operations. A summary of the aerial photograph review is included in Table 1-2, and the history of the Lenz Oil site is described in detail in Technical Memorandum No. 1 (Appendix B).

Based on an examination of a 1954 aerial photograph, the site was an open field with woodlands along the eastern side of the site prior to the establishment of Lenz Oil by

Mr. Winston Lenz of Hinsdale, Illinois, in April 1961. Lenz Oil originally collected waste oils from local service stations and other small businesses, temporarily stored the waste in tanks on the site, and then shipped it to local oil recycling facilities. Lenz Oil also supplied oils and construction materials for roadwork projects. Sometime between April 1961 and December 1980, the waste oil collection, storage, and transport operation was expanded to include waste solvents. A summary of the types of wastes accepted by the Lenz Oil facility and the nonwaste materials stored at the facility is shown on Table 1-3. A detailed analysis of the Lenz Oil waste stream is presented in Technical Memorandum No. 1 (Appendix B).

The waste transport, storage, and disposal activities conducted at the Lenz Oil facility are not documented in the regulatory files for the time period between April 1961 and October 1980. Based on an examination of the historical aerial photographs from 1961, 1967, 1971, 1974, and 1981, the on-site storage capacity for waste oils and spent solvents expanded considerably from 1961 to 1981. Brief descriptions of these aerial photographs are presented in Table 1-2.

In 1980, Mr. Charles Russell purchased Lenz Oil and took over operations at the facility. Also beginning in 1980, Lenz Oil applied for the necessary permits to operate a waste oil and spent solvent storage and transfer facility in the State of Illinois. In response to an IEPA inspection of the facility on October 2, 1980, and the subsequent notification that the facility was operating without the required state permits, Lenz Oil applied for a permit from the IEPA to operate a waste management site at their facility. In response, the IEPA outlined several tasks that Lenz Oil had to complete prior to the issuance of the requested operating permit, including:

- The preparation of a contingency plan,

- Leak testing of the three 30,000-gallon underground storage tanks,
- Installation of two monitoring wells (OW-1 and OW-2),
- Collection of ground water samples from the monitoring wells, and
- The preparation of a plan to limit further ground water degradation resulting from the operation of the Lenz Oil facility.

These tasks were performed by Soil Testing Services, Inc. (STS) on behalf of Lenz Oil. The IEPA issued the necessary permits to operate a storage and transfer facility for waste oils and spent solvents to Lenz Oil in July 1981 with the requirement that Lenz Oil assess the extent of ground water contamination, and submit a plan to limit the further degradation and upgrade the quality of ground water in the area.

To assess the ground water contamination at the site, Lenz Oil collected ground water samples from monitoring wells OW-1 and OW-2 on April 8, 1981 and October 23, 1981 for laboratory analysis of oil and grease. The analytical results show the presence of oil and grease in the samples from both monitoring wells during both rounds of sampling. The downgradient monitoring well (OW-2) exhibited the highest concentrations of oil and grease during both sampling events. According to IEPA records, both monitoring wells were subsequently sampled on a quarterly basis for analysis of a selected set of organic and inorganic constituents. Lenz Oil made no additional attempt to assess the extent of ground water contamination at their facility or to initiate a program to upgrade the ground water quality in the vicinity of the site, as required under their operating permit. However, in an attempt to prevent future degradation of ground water by the operation, Lenz Oil paved the area where trucks loaded and unloaded waste oils and solvents into and out of the underground storage tanks. This measure was approved by the IEPA and was completed by Lenz Oil during the first quarter of 1982.

On November 19, 1980, Lenz Oil submitted an application to the USEPA for a Resource Conservation and Recovery Act (RCRA) Part A Permit to store hazardous material in tanks at their facility. In December 1982, the USEPA issued a Consent Agreement and Compliance Order stating that Lenz Oil was operating their facility without an interim status permit. The site continued to operate and was required to obtain the appropriate hazardous waste permits. During November of 1984, Lenz Oil stopped accepting hazardous waste (i.e., spent solvents); and on November 13, 1984, they requested the withdrawal of the facility's Part A Permit, stating that the site no longer handled hazardous waste. On February 5, 1985, Noble and Associates, on behalf of Lenz Oil, submitted a closure plan for the portion of the facility that handled hazardous waste. The IEPA confirmed that solvents were no longer being handled by the facility on February 6, 1985; and the IEPA approved a partial closure plan on July 22, 1985.

In response to reports that Lenz Oil was discharging waste material from storage lagoons at their facility to the drainage ditch to the north of their facility, the IEPA notified Lenz Oil on February 7, 1985 that these discharges were an apparent violation of Illinois statues. Lenz Oil informed the IEPA that the company was in the process of pumping the liquid from the two lagoons into on-site storage tanks where it would be held until proper disposal could be arranged. The material in the lagoons was reportedly crank case oil with 10 to 20 percent water and was allegedly pumped into the lagoons as an emergency measure following the malfunction of oil lines at the facility.

The IEPA collected samples from the surface impoundments and the drainage ditch to the north of the facility. The analytical results for these samples show elevated concentrations of organic compounds and metals in both samples. Pursuant to an anonymous complaint on April 24, 1985, the IEPA inspected the Lenz Oil site again and noted the presence of a milky white material with a petroleum odor being discharged from the facility and entering into the drainage ditch to the north of the site.

Later in April 1985, the IEPA referred a law suit to the Illinois Attorney General's Office alleging mismanagement of hazardous waste at the Lenz Oil facility. Numerous permit violations involving: (1) manifest infractions, (2) inadequate waste handling practices, and (3) reported releases of hazardous waste to local ground water and surface water systems were the basis for the law suit by the IEPA against Lenz Oil and Mr. Russell. An order, agreed upon by the parties, was entered by the Circuit Court of DuPage County in May 1985. The order required Lenz Oil and Mr. Russell to initiate immediate clean-up actions and to file a closure and compliance plan.

An immediate clean-up plan was filed by Hamman & Benn on behalf of Lenz Oil on May 30, 1985, and several clean-up activities were started at the site. Concurrent with the submittal of the immediate clean-up plan, Lenz Oil took various actions including: (1) pumping all of the contaminated liquids stored on the site into tanks for storage until receiving approval for final disposal, and (2) recontouring the surface of the site to stop the ponding of liquid and to block the flow to the drainage ditch to the north of the site. Arrangements were also made to sample the soil from the surface impoundments and ground water from the on-site monitoring wells. Changes in operational procedures prevented the use of the two lagoons as emergency containment areas. On July 13, 1985, a further clean-up plan was filed by Hamman & Benn on behalf of Lenz Oil.

In early 1985, the following storage vessels were located at the Lenz Oil facility:

- Three high-capacity (30,000- to 80,000-gallon) underground, unlined, concrete storage tanks.
- Fourteen (14) low- to moderate-capacity aboveground or partially buried steel tanks.
- Six low-capacity underground steel tanks.
- Nine tank trucks with a total capacity of over 30,000 gallons.
- A drum storage area containing approximately 200 drums.
- Three surface impoundments constructed of porous cinder-type material that were used for hazardous waste storage.

An inspection of the facility by the IEPA in November 1985 revealed that the facility was in general disarray and appeared to be abandoned. Approximately 25 percent of the ground surface was covered with standing oily water. Storage tanks were filled to the overflow point, and it did not appear that the facility had adequate spill or leak containment structures. The following features were located on the site at the time the facility was abandoned: a wood-frame office building, a concrete-block storage shed, a concrete maintenance building or garage, a radio tower, two monitoring wells (OW-1 and OW-2), a number of aboveground and underground tanks, several tank trucks, a former surface impoundment area, and a cinder pile (Figure 1-3). A fence with two access gates along Jeans Road enclosed the active portion of the facility.

After confirming the operating status of the facility and assessing the hazardous nature of the site, the IEPA filed a Record Of Decision (ROD) on January 17, 1986 for the remedial action required at the Lenz Oil site. According to the ROD, the remedial action activities at the Lenz Oil site would be conducted in the following three phases:

- Phase I - a multifaceted RI:

- Phase II - the removal and disposal of hazardous waste, including contaminated soil, from the site; and

- Phase III - the remediation of ground water, if required.

In addition, the ROD indicated that the Phase III activities, if necessary, would be the subject of a future ROD.

In April 1986, Mr. Charles Russell filed for bankruptcy and completely abandoned the facility (IEPA, 1985). Beginning on April 15, 1986 and ending on November 30, 1986, the IEPA and its contractors, Wehran Engineering Corporation (Wehran Engineering) and Petrochem Services, Inc., completed the Phase I activities described in the ROD. Specifically, the Phase I activities consisted of the following tasks:

- On-site drums, tanks, and tank trucks were inventoried, sampled, and secured. Sample analyses indicated that the drums primarily contained oils, solvents, and tar waste, and the tanks and tank trucks contained oils and solvents.

- The site was surveyed with a magnetometer and a metal detector to identify buried objects, such as piping systems and drums. A few small anomalies were identified, but the precise dimensions of the anomalies could not be determined and the buried objects were not identified.

- Numerous surface and subsurface soil samples were collected and analyzed for organic compounds. Organic contaminants including solvents and petroleum-based products were detected in the soils at concentrations up to 2,000 ppm.

- Eleven (11) monitoring wells, arranged in five well clusters, were installed to evaluate the hydrogeology of the site and to assess the ground water quality at several depth intervals, ranging from 8 to 38 feet below ground level. Samples were collected from these wells and several private wells in the vicinity of the site. The laboratory analytical results show that these ground water samples contained various volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals.

- Potentially explosive storage tanks were blanketed with nitrogen, all tank penetrations were sealed, berms were constructed to reduce off-site drainage, and a local contractor was hired to conduct weekly site inspections to ensure that these emergency measures were maintained.

The Phase I sampling locations and the site features in existence at the completion of Phase I are shown on Figure 1-4.

After completing the Phase I activities and evaluating the results of that investigation, the IEPA amended the January 17, 1986 ROD by issuing the "IEPA Record of Decision Addendum to January 17, 1986 Record of Decision." Based on our review of the Lenz Oil files, two separate versions of this addendum have been issued by the IEPA. One of the documents is attached to an approval memorandum dated January 15, 1987 that has been initialed and dated by IEPA Director Carlson and other IEPA personnel. The other document was signed and dated by IEPA Director Carlson on January 16, 1987.

According to the document dated January 15, 1987, the Phase I activities were completed, and the Phase II activities (i.e., the Emergency Remedial Action) would consist of the following tasks:

- Constructing a slurry wall that would divide and segregate the highly contaminated (southwest) portion of the site from the less contaminated (northeast) portion of the site,

- Excavating all tankage and associated contaminated soil from the southwest portion of the site,

- Incinerating all excavated materials as well as all drummed and bulk liquid wastes,

- Determining the effects of the site on the local ground water and developing alternative water sources for the affected local residences, and

- Designing and installing a permanent cap over the portion of the site used for the oil and solvent operation.

This document also indicates that the scope of the proposed Phase II (i.e., Emergency Remedial Action) activities was not intended to result in the complete restoration of the site, but rather to reduce the gross immediate environmental hazards presented by the liquids, drummed waste, and leaking underground storage tanks at the site. According to the January 15, 1987 document, The Emergency Remedial Action would result in the remediation of approximately 100 percent of the on-site liquids, 100 percent of the drummed waste, and 60 percent of the contaminants in the soil.

This version of the ROD Addendum states that the Phase III activities (i.e., the Site Remediation) would be conducted simultaneously with Phase II and would include placing the Lenz Oil site on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list and conducting the required screening activities to score the site for the National Priorities List (NPL). If the site scored high enough to be placed on the NPL, an RI/FS would then be conducted at the site, an appropriate remedy would be designed and constructed, and the IEPA would petition the USEPA for the State's cost-share reimbursement of nonfederal expenditures.

The other version of the IEPA ROD Addendum, dated January 16, 1987, states that the Phase I activities were completed and that Phase II of the Remedial Action would include the treatment of contaminated soil, sludges, liquids, and semisolid waste by an on-site incineration system. This ROD Addendum establishes clean-up objectives for the contaminated soil and sludges and indicates that all of the residual ash will be returned to the excavated areas. According to this ROD Addendum, the Phase III activities, if necessary, would include: (1) capping the site with an impermeable clay layer, and (2) remediating the ground water.

According to Janssen (1988), the Phase II activities, which began in the spring of 1987 and were completed in July 1988, consisted of the following tasks:

- A mobile rotary kiln incinerator operated by ENSCO was set up at the site.
- All drum, tank, and tank truck contents were incinerated.
- The drums were shredded and incinerated, and the tanks and tank trucks were emptied, decontaminated, and transported off site.
- All aboveground and underground structures were removed.
- Soil in the vicinity of the underground storage tank farms and buried drums was excavated to a depth of 9 to 11 feet (i.e., the top of bedrock) and incinerated (see main excavation area on Figure 1-4).
- Hot spots were excavated and incinerated in the area of the former surface impoundments (Figure 1-4).

- The residual ash from the incineration was returned to the excavations.

- Municipal water was made available to residences on Jeans Road and all residences formerly using private wells in the immediate vicinity of the site.

- The site was covered with topsoil, and grass was planted.

A total of 21,000 tons of contaminated soil was excavated and incinerated, and the ash was returned to the excavation area (Figure 1-5). The relative proportion of soil removed from the main excavation area versus hot spots outside the main excavation area is unknown. Contaminated soil was excavated to bedrock (i.e., 9 to 11 feet below ground surface) and until the sidewalls of the excavation contained less than 5 ppm of total VOCs. This was achieved in most places at a depth of 9 to 11 feet below ground surface, which corresponds with the top of bedrock. To maintain the integrity of well cluster G105, which was situated in the main excavation area, the IEPA left a column of soil approximately 6 to 8 feet in diameter in place around the well cluster (Wilder, 1992).

After the soil was removed from the main excavation area, the IEPA installed a 10-mil (0.001-inch) layer of pond-liner-grade visqueen above the bedrock at the base of the excavation pit. The visqueen was installed manually, and overlapping layers were solvent welded. The liner covers the entire main excavation area, including the floor, sidewalls, and approximately one (1) foot of the level ground surrounding the excavated area. According to Wilder (1992), the liner was placed up the sides of the column of soil surrounding well cluster G105 and pulled up to and around the wells. Well cluster G105 and the surrounding column of native soil were therefore separated from the rest of the main excavation area. Incinerator ash was then placed above the visqueen as backfill material. The hot spot excavation areas were not lined with visqueen but were backfilled with clean material rather than incinerator ash. Information concerning the soil excavation, liner installation, and incineration activities was gathered from Janssen (1988), Janssen (1990), the IEPA (1990), and Gardenour (1990).

Although one of the versions of the "IEPA Record of Decision Addendum" states that the IEPA was planning to construct a slurry wall and a permanent cap on the site as part of the Phase II activities, the site records show that neither of these activities were ever completed. In addition, the site records do not clearly indicate whether the IEPA: (1) determined not to perform these activities before or after initiating Phase II, (2) ever documented their reason for nonperformance, or (3) is still obligated to complete these tasks.

On March 30, 1988, the Lenz Oil Service, Inc. Participating Respondents entered into a judicial Consent Decree with the IEPA and the State of Illinois that constitutes a full settlement of certain current and future site clean-up costs. According to the Consent Decree, if the USEPA requires any additional remedial activities at the site, other than ground water remediation, the additional remediation "shall be dealt with by the State."

On October 23, 1984, the IEPA identified the Lenz Oil site as a potential hazardous waste site to the USEPA in the form of a Preliminary Assessment (USEPA, 1984). A site inspection was conducted by Wehran Engineering, and a potential hazardous waste site inspection report was submitted on August 14, 1987. On October 2, 1987, a Hazard Ranking System (HRS) report for the Lenz Oil site was filed with USEPA Region V. The USEPA proposed that the Lenz Oil site be included on the NPL in June 1988 with a HRS of 42.33 (USEPA, 1987a). The NPL listing became final in September 1989. On

November 28, 1989, the USEPA and the Lenz Oil Participating Respondents signed an Administrative Order by Consent to perform an RI/FS of the Lenz Oil site. In accordance with the consent order, ERM-North Central, on behalf of the Lenz Oil Participating Respondents, submitted an RI/FS Work Plan for the Lenz Oil site to the USEPA on January 22, 1990. The Work Plan was approved by the USEPA and the IEPA on December 18, 1990, and the RI/FS activities were initiated on January 1, 1991.

TABLES

TABLE 1-1

SUMMARY OF REMEDIAL INVESTIGATION TASKS
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 1 of 2)

Task 1 - Description of Current Situation

- Site Background Investigation
- Nature and Extent of Contamination
- History of Response Actions
- Site Boundary Survey and Base Map
- Site Grid and Topographic Survey
- Historical Aerial Photograph Analysis
- Area Ground Water Usage Survey
- Evaluation of Ground Water Flow
- Regional Bedrock Fracture Analysis
- Technical Memorandum No. 1
- Subcontracting and Mobilization
- Soil Gas Investigation
- Technical Memorandum No. 2

Task 2 - Site Investigation

Phase I

- On-Site Soil Sampling
- Monitoring Well Installation
- Site-Specific Fracture Analysis
- Aquifer Characterization
- Round One Ground Water Sampling
- Nonaqueous Phase Liquid Sampling
- Sediment and Surface Soil Sampling
- Surface Water Sampling
- Phase II Work Plan (Parts A and B)

Phase II

- Additional On-Site Soil Sampling
- Surface Water Resampling
- Monitoring Well Installation
- Round Two Ground Water Sampling
- Private Well Sampling
- Nonaqueous Phase Liquid Sampling

TABLE 1-1

SUMMARY OF REMEDIAL INVESTIGATION TASKS
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 2 of 2)

Task 3 - Site Investigation Analysis

- Data Validation and Sufficiency Evaluation
- Data Analysis and Summary
- Contaminant Pathway and Transport Evaluation
- Baseline Risk Assessment

TABLE 1-2

HISTORICAL AERIAL PHOTOGRAPH CHRONOLOGY
LENZ OIL SITE
LEMONT, ILLINOIS

1954	The 1954 aerial photograph shows the condition of the site prior to the establishment of the Lenz Oil Service, Inc. facility. The site primarily consisted of an open field with woodlands located in portions of the eastern side and two buildings situated at the eastern corner. The westernmost building may have been a residence or former residence, and the other was a garage or large shed. A drainage ditch and railroad tracks were located adjacent to the northwestern boundary of the site, and a farm was located to the south, just across Jeans Road. The property was bound by State Route 83 to the west and a wooded area (i.e., the future Corwin Lenz residence) to the east.
1961	By 1961, a maintenance building had been constructed at the south-central portion of the site, and the underground tank farm immediately north of the maintenance building was in place. Aboveground tanks, tank trucks, and possibly drums were located in an area to the southwest of the underground tank farm. Immediately west of this location was a cleared area or a cement pad. At least three tank trucks were parked on the site. The house noted on the 1954 photograph may have been converted to an office building.
1967	Between 1961 and 1967, another underground tank farm was constructed to the northwest of the underground tank farm noted in the 1961 photograph, and a cluster of aboveground tanks was located to the west of the underground tank farm. A parking shed was constructed in the western portion of the site, and only the south half of the parking shed was covered with a roof. A trailer or mobile home was situated just east of the property, and an area of scattered unknown objects was located immediately northeast of the mobile home. Several tank trucks were parked on the site.

TABLE 1-2

HISTORICAL AERIAL PHOTOGRAPH CHRONOLOGY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 2 of 3)

1971	Three aboveground tanks were installed around the maintenance building between 1967 and 1971. A metal shed was constructed between the three underground tank farms to the north of the maintenance building. Another underground tank farm was built immediately west of the aboveground tank farm located on the western portion of the site. In addition, the northern half of the parking shed was covered by 1971. A surface impoundment, containing liquid, was present for the first time in the 1971 photograph. Two large areas of disturbed ground and/or unidentified objects surrounded the impoundment. Several tank trucks were parked around the site, which may have been partially enclosed with a fence.
1974	Two large cylindrical aboveground tanks were added near the center of the property between 1971 and 1974. In addition, a large rectangular aboveground tank was installed to the north of the cylindrical tanks. Another tank farm was constructed to the north of this large rectangular aboveground tank. The surface impoundment was still present in 1974 and still contained liquid. Several tank trucks were parked around the site, and a mobile home or tank truck was located just east of the site, on the Corwin Lenz property.
1981	Additional aboveground tanks were added to the tank farm to the north of the cylindrical tanks. A small underground tank farm was added to the east and adjacent to the aboveground tank farm, located to the east of the parking shed. Although the surface impoundment noted in previous photographs may have been present in 1981, it is not clear from the photograph whether the feature is a surface impoundment or a cinder pile. Several tank trucks were parked around the site.

TABLE 1-2

HISTORICAL AERIAL PHOTOGRAPH CHRONOLOGY
LENZ OIL SITE
LEMONT, ILLINOIS

1988	Operations had ceased at the Lenz Oil facility, and remedial activities had begun. An incinerator and a support area were established on the eastern side of the site. Although approximately 75 percent of the site appeared to have been excavated to various degrees, the site's main structures (i.e., the maintenance building, parking shed, and office building) were still present.

TABLE 1-3

WASTE AND NONWASTE STORAGE SUMMARY
LENZ OIL SERVICE, INC.
LEMONT, ILLINOIS

Waste Materials Accepted

Waste Oils	Spent Solvents
Motor oil	Oxygenated solvents
Hydraulic oil	Methyl ethyl ketone
Cutting oil	Toluol/Toluene
Lubricating oil	Ethanol
Transformer oil	Hexane
	Heptane
Other Wastes	Acetate
	Alcohol
Pigments	Zylol/Xylene
Inks	Butanol
Kerosene	Ethyl acetate
Aliphatic hydrocarbons (nonspecific)	Aromatic naptha
Aromatic hydrocarbons (nonspecific)	Aliphatic naptha
Petroleum hydrocarbons (nonspecific)	1,1,1-Trichloroethane
Chlorinated hydrocarbons (nonspecific)	Acetone
	Naptha
	Trichloroethene
	Methylene chloride

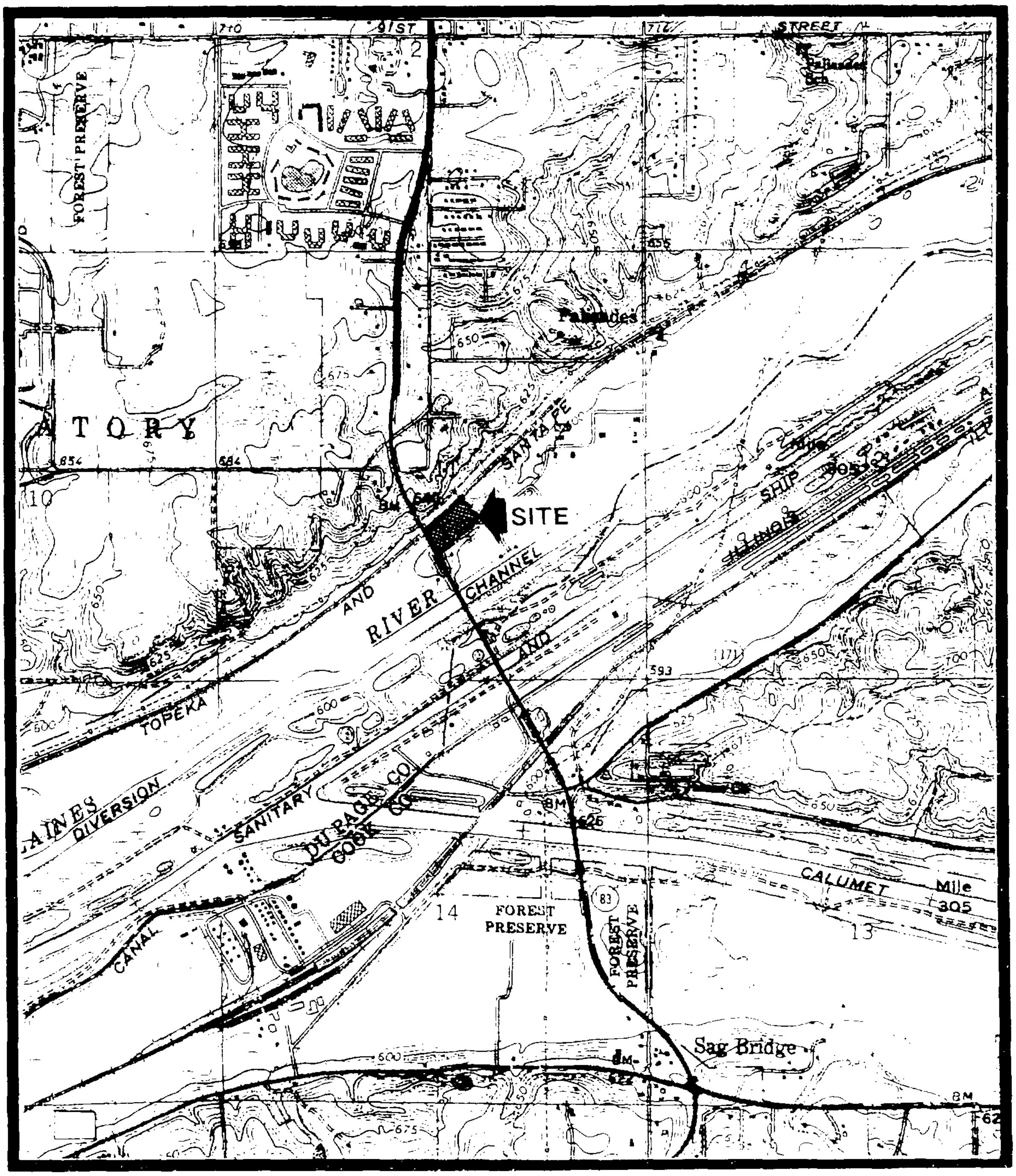
Nonwaste Materials Stored

Asphalt	Diesel Fuel	Gasoline

FIGURES

SAG BRIDGE QUADRANGLE
ILLINOIS
7.5 MINUTE SERIES (TOPOGRAPHIC)
1963
PHOTOREVISED 1973
PHOTOINSPECTED 1978

N
W E
S



SCALE 1:24000

1 .5 0 1 MILE

CONTOUR INTERVAL 5 FEET

QUADRANGLE LOCATION

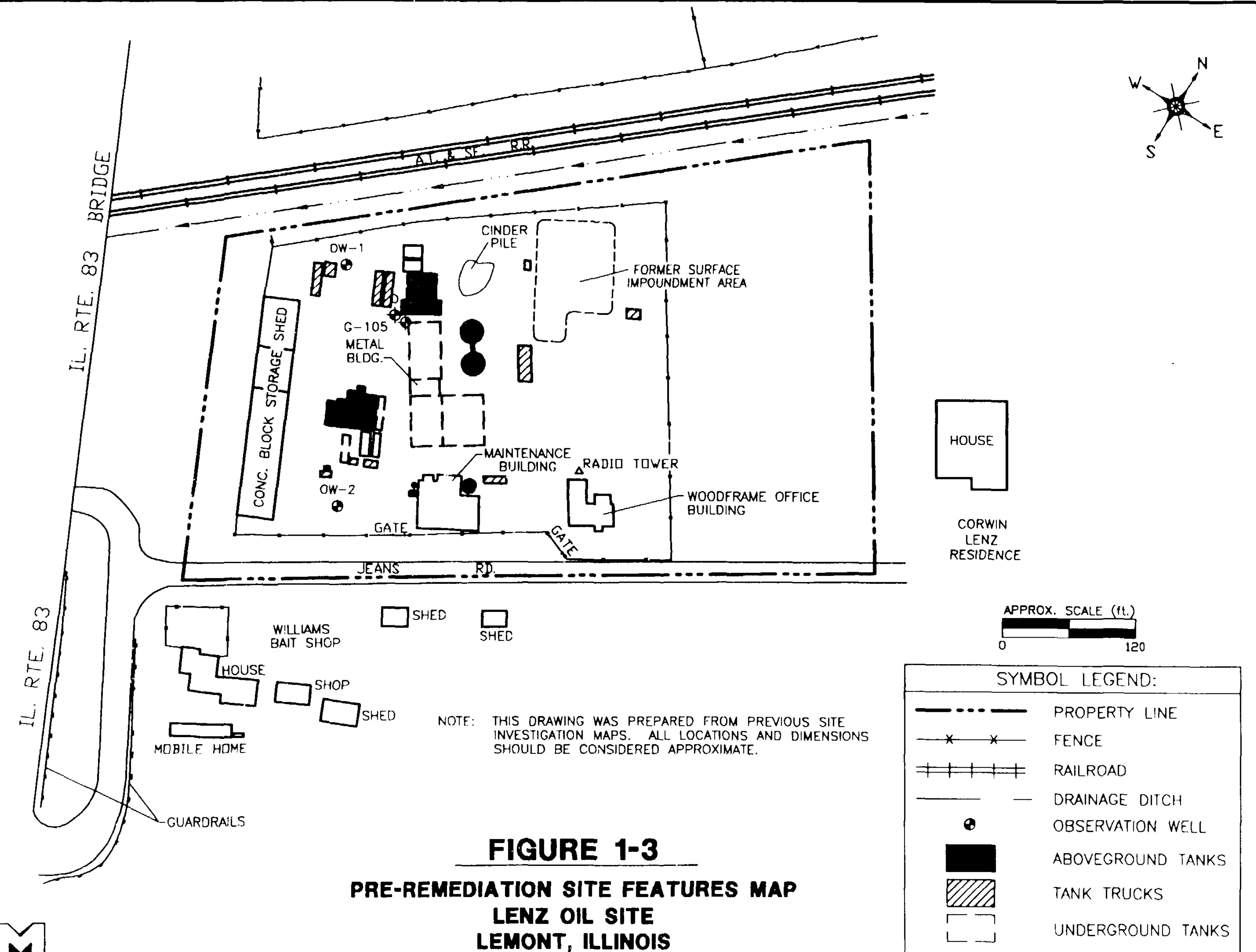
FIGURE 1-1

SITE LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

PROJECT: 0252-7
REPORT: RI
DRAWN: MO
CHECKED:
DATE: 6/22/92
APPROVED:
CLIENT NAME: LENZ OIL

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:	CLIENT NAME:
0252-7	RI	GW-		6/25/92		LENZ OIL



NOTE: THIS DRAWING WAS PREPARED FROM PREVIOUS SITE INVESTIGATION MAPS. ALL LOCATIONS AND DIMENSIONS SHOULD BE CONSIDERED APPROXIMATE.

FIGURE 1-3

PRE-REMEDIATION SITE FEATURES MAP
LENZ OIL SITE
LEMONT, ILLINOIS

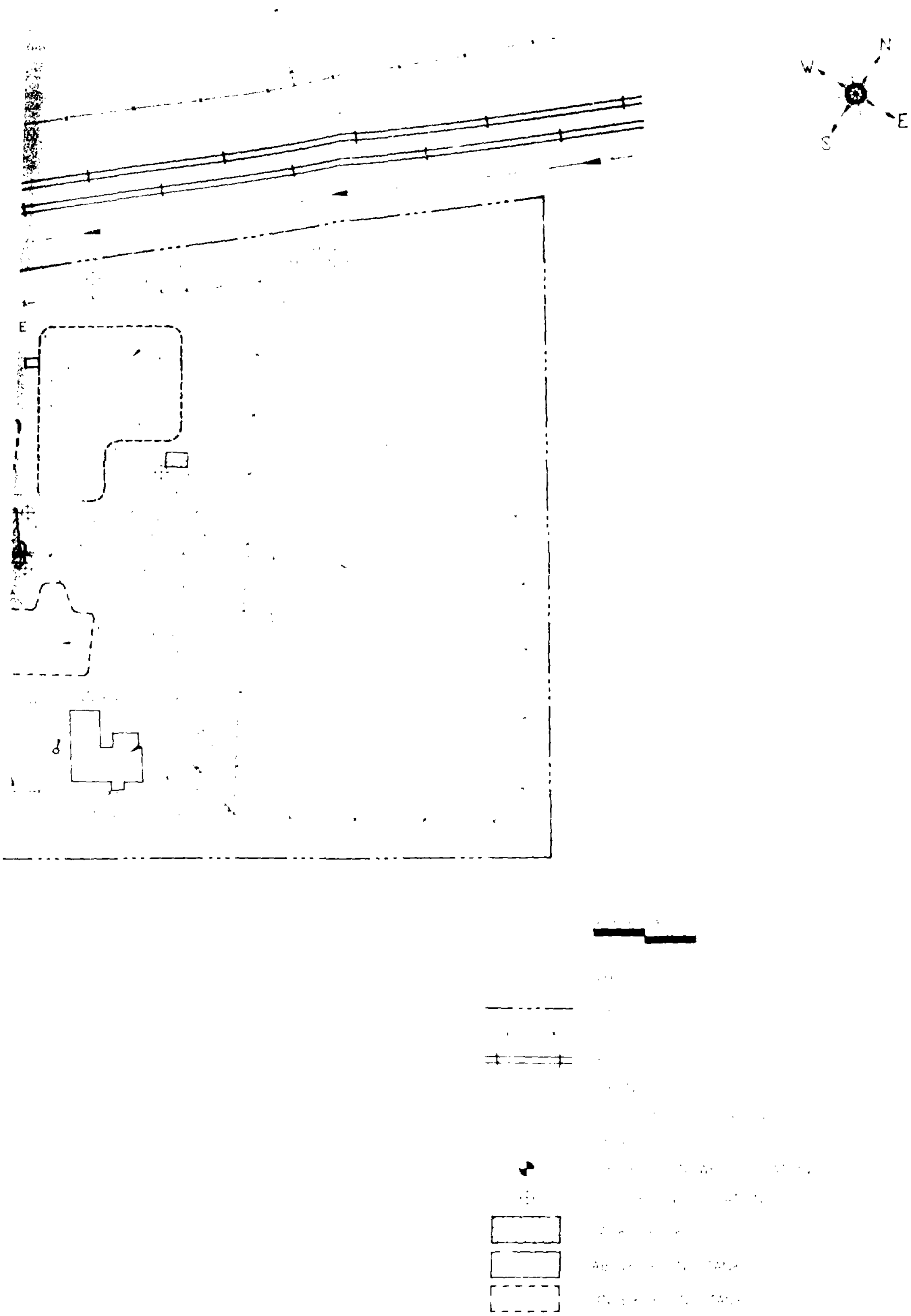
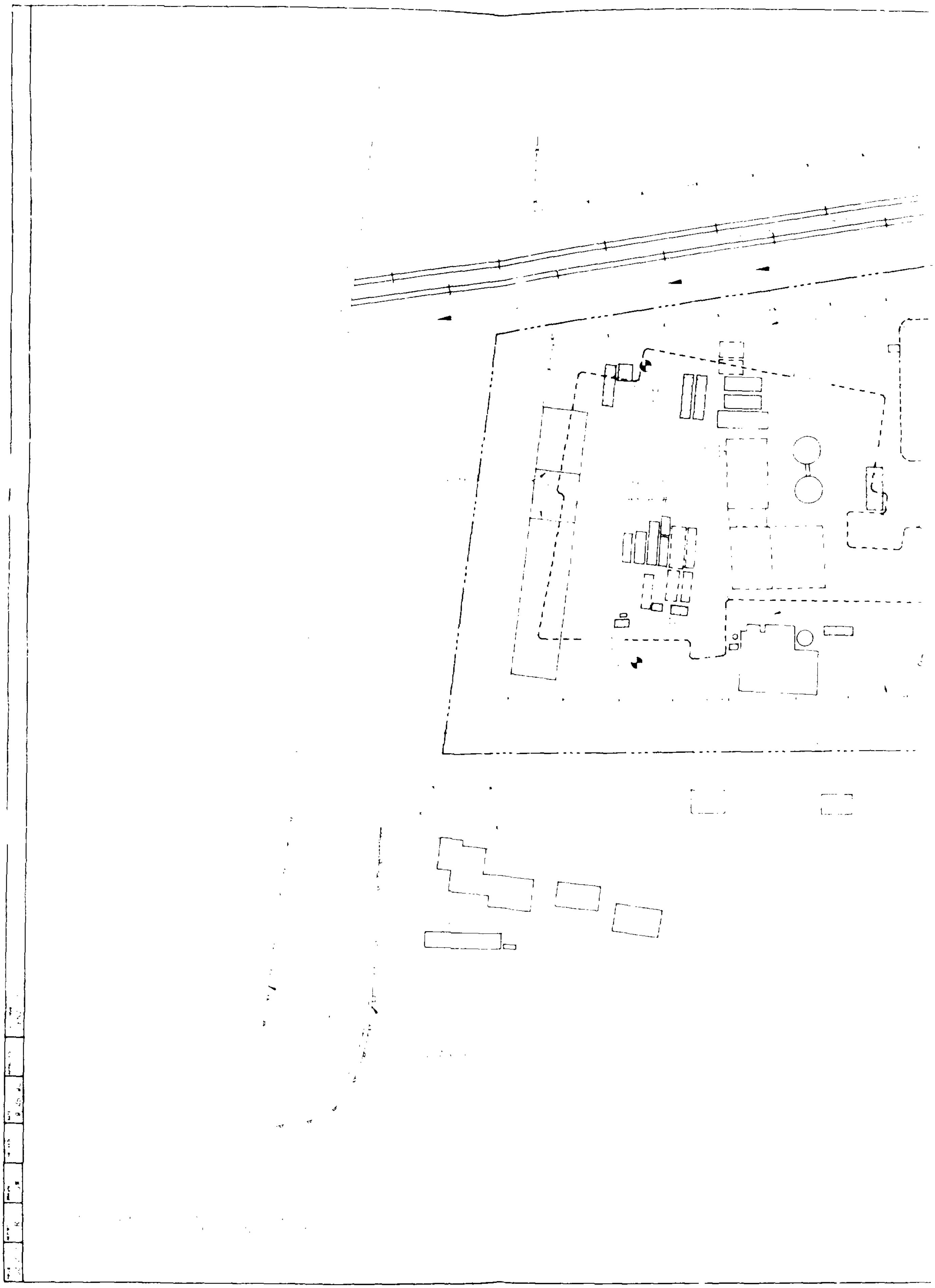


FIGURE 1-4

SITE INVESTIGATION/REMEDIATION FEATURES MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM



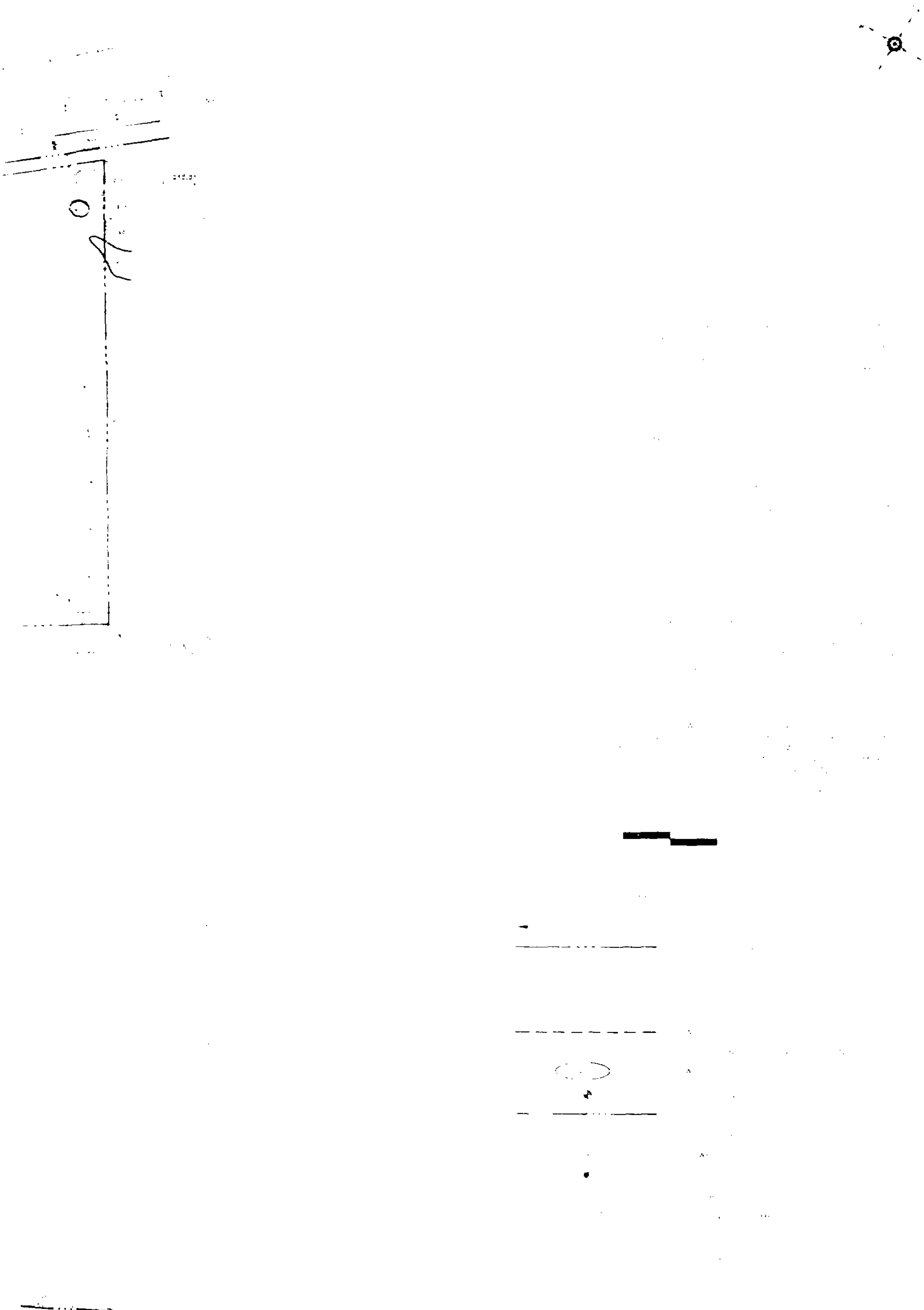
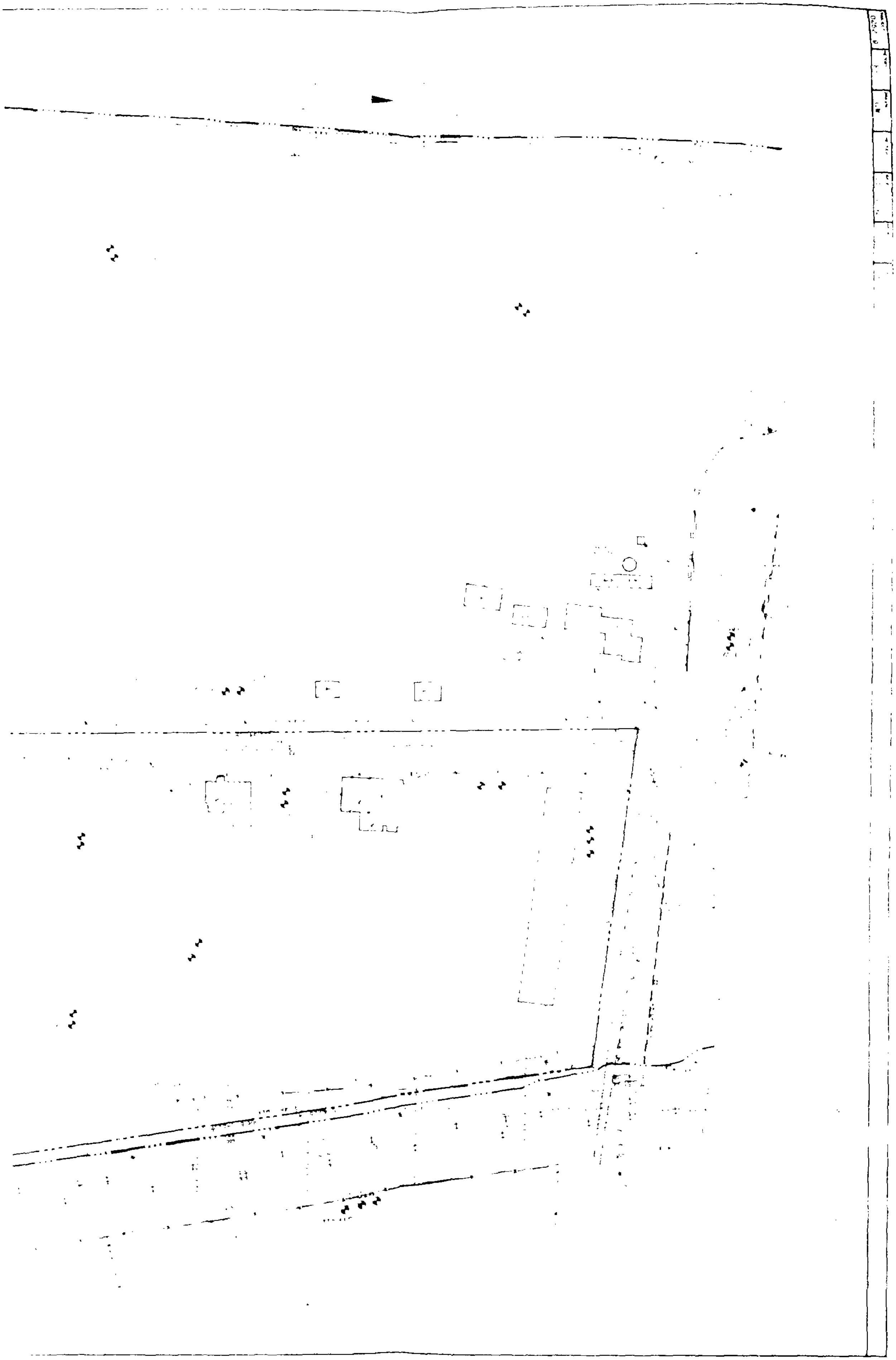
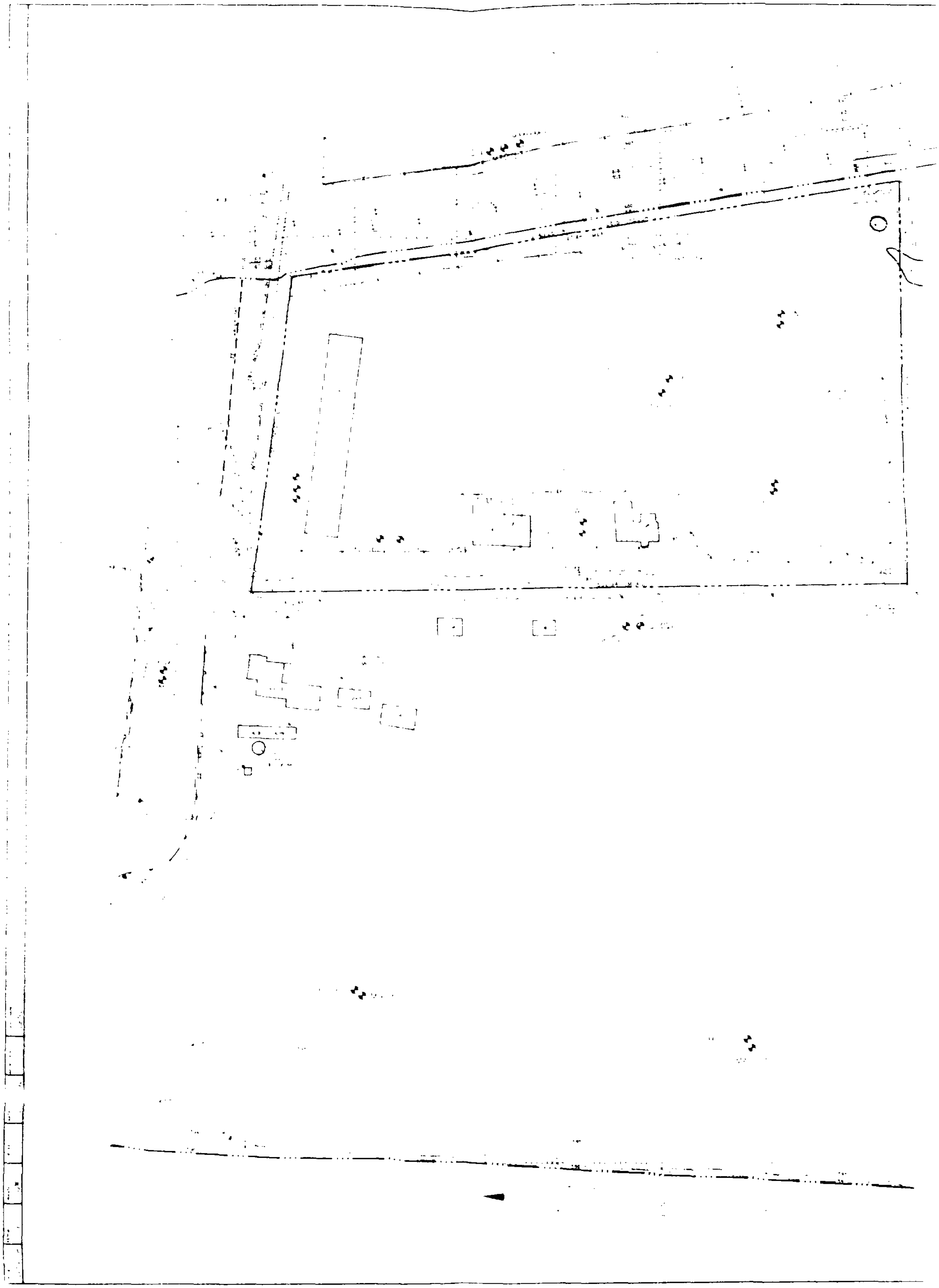


FIGURE 1-2

SITE BASE MAP
LENZ OIL SITE
LEMONT, ILLINOIS





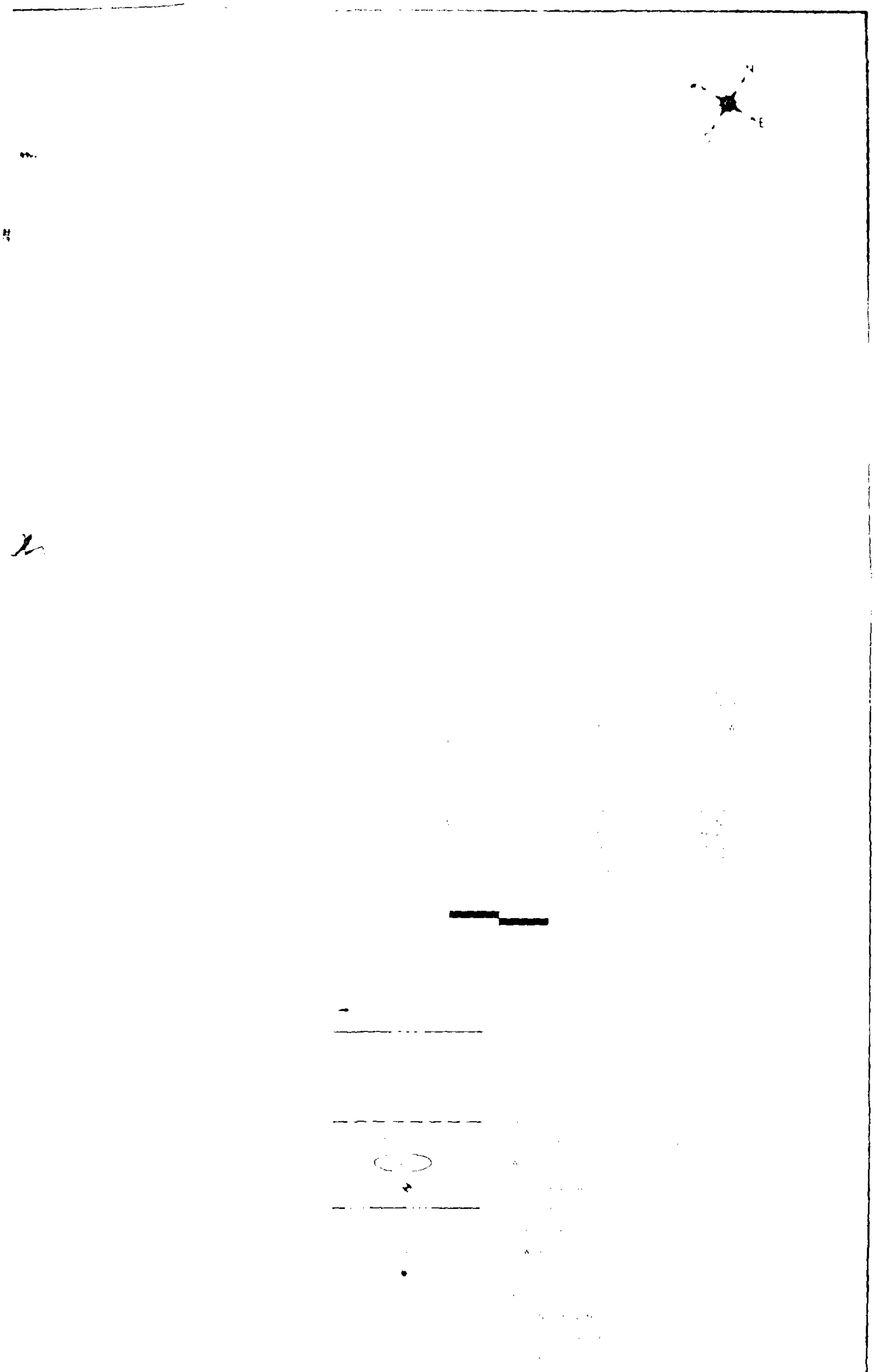


FIGURE 1-2

SITE BASE MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

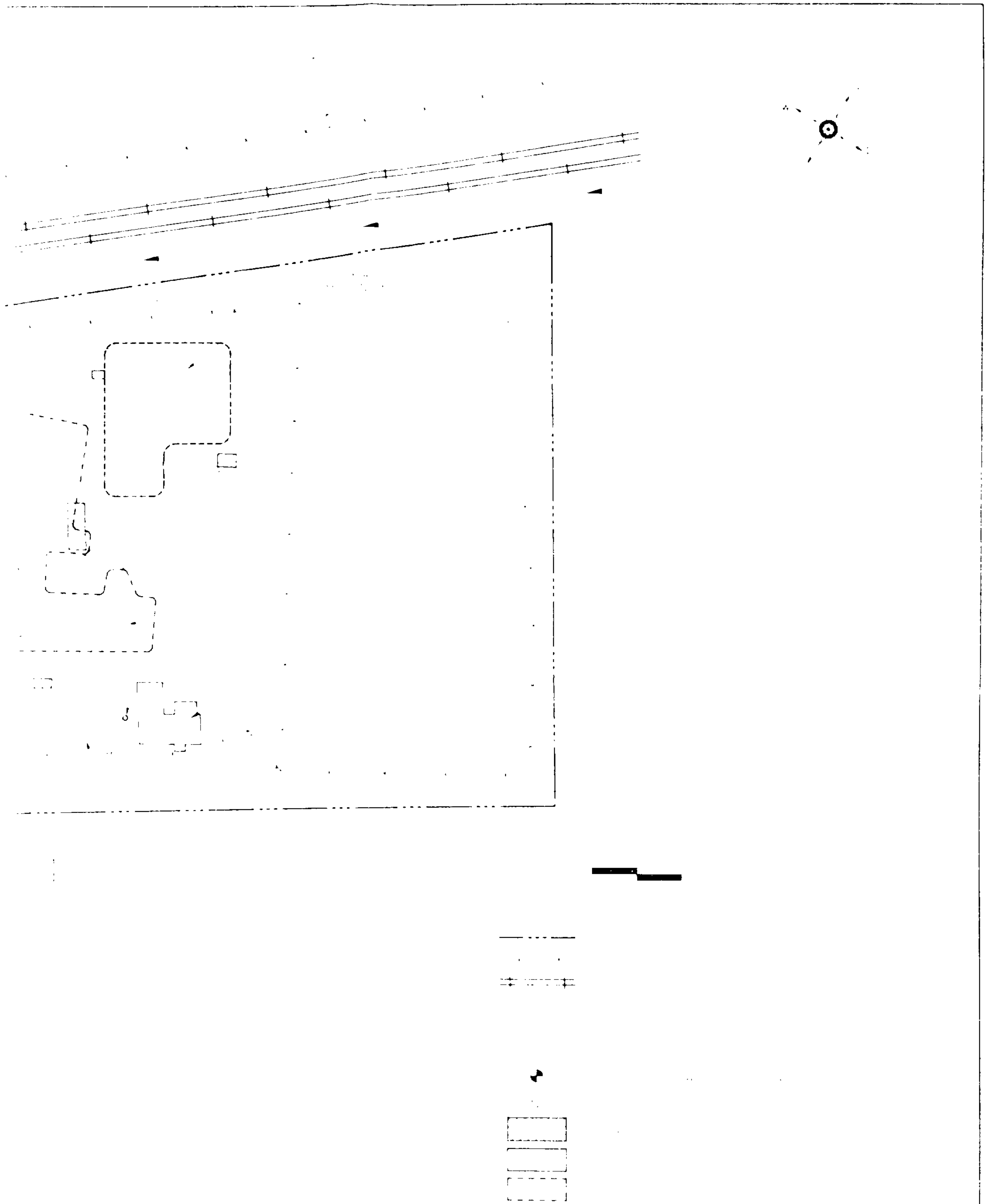


FIGURE 1-4

SITE INVESTIGATION/REMEDIATION
FEATURES MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:	CLIENT NAME:
0252-7	RI	GW-		6/25/92		LENZ OIL

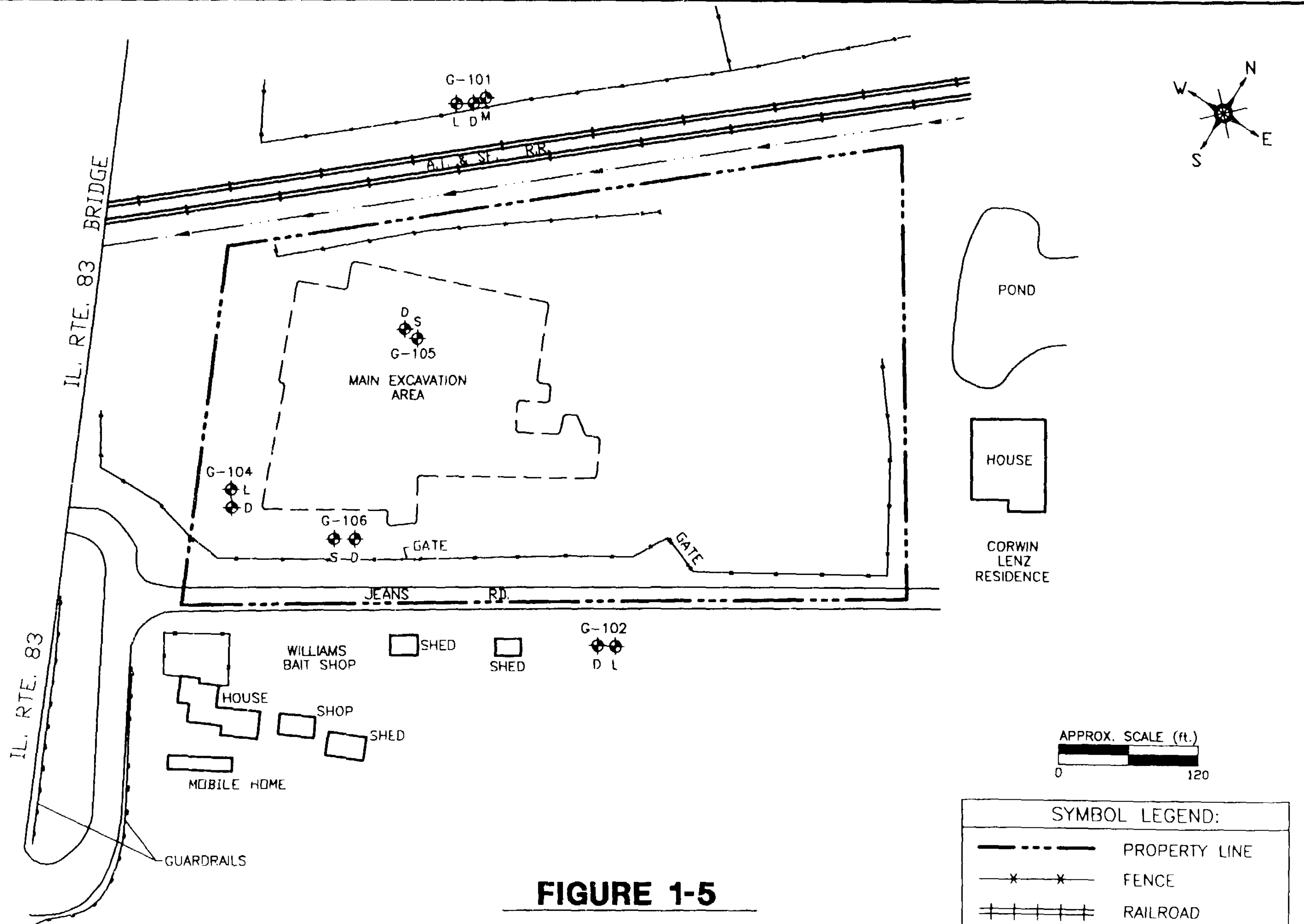


FIGURE 1-5

POST-REMEDIATION SITE FEATURES MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

2.0 METHODS OF INVESTIGATION

The following investigation activities were performed during the Lenz Oil site RI:

- Site history and background investigation,
- Historical aerial photograph analysis,
- Ground water usage survey,
- Site boundary and topographic survey,
- Surface features investigation,
- Meteorological investigation,
- Soil gas investigation,
- Soil investigation,
- Surface water investigation,
- Sediment investigation,
- Geological investigation,
- Ground water investigation,

- NAPL investigation,
- Human population survey, and
- Ecological investigation.

This section describes the objectives of the foregoing activities and the methods that were followed during the completion of these tasks. Any deviations from the methods proposed in the approved Work Plans are also discussed.

2.1 Site History and Background Investigation

Background information pertaining to the Lenz Oil site was obtained from the USEPA, IEPA, and Participating Respondents. The types and quantities of wastes accepted at the Lenz Oil site were determined from a review of available documentation provided by the USEPA and IEPA. The IEPA records also describe the regulatory history; response actions; and the results of soil, sediment, surface water, ground water, and container sampling. The results of previous investigations were used to evaluate the nature and extent of contamination and to develop a preliminary conceptual model for the site. Information regarding the history of site ownership was provided by the Participating Respondents.

2.2 Historical Aerial Photograph Analysis

ERM-North Central conducted an analysis of historical and current aerial photographs of the Lenz Oil site, including all of the aerial photographs of the site available from the U.S. Department of Agriculture, to assess the history of operations. These photographs document the physical conditions and the expansion of operations at the Lenz Oil site. Seven black and white photographs, dated 1954, 1961, 1967, 1971, 1974, 1981, and 1988, were evaluated as part of this analysis. These photographs represent a period of 34 years and provide an indication of on-site: (1) operations expansion, (2) storage areas, (3) waste disposal areas, and (4) drainage patterns.

2.3 Ground Water Usage Survey

ERM-North Central performed a ground water usage survey for an area within two miles of the Lenz Oil site. The survey included a review of all of the water well records available from the Illinois Geological Survey and the Illinois State Water Survey (ISWS) for the area of interest as well as water usage records for local water systems. These ground water usage data were analyzed in relation to the hydrogeologic system at the Lenz Oil site to determine: (1) the usable aquifers in the area; (2) the number, type, and location of wells in the vicinity of the site; (3) the construction (i.e., depth, casing, screen materials, and screened intervals) of the wells in the area; (4) the number and location of wells that pump water from the potentially contaminated aquifer; and (5) the wells that were suitable candidates for sampling during Phase II of the RI.

2.4 Site Boundary and Topographic Survey

In January 1991, Patrick Engineering of Glen Ellyn, Illinois, completed a boundary survey and established a 100-foot-interval grid system at the site to ensure the accurate delineation of the site boundaries, sampling points, and contaminated areas. Additionally, ground elevation and site features data were collected to provide topographic information for developing topographic maps, site base maps, and geologic cross sections.

2.5 Site Features Investigation

Regional and site-specific topographic and physiographic data pertinent to the Lenz Oil site RI were compiled from published sources and field inspections. ERM-North Central obtained the regional topographic data from the U.S. Geological Survey (USGS) 7.5-minute topographic map of the Sag Bridge quadrangle and the regional physiographical information for DuPage County from Wilman (1971). Physiographic and other site-specific surface features data were derived from field inspections of the site, and the topography of the site was determined from the survey base map prepared by Patrick Engineering.

2.6 Meteorological Investigation

Meteorological data recorded at the O'Hare International Airport weather station, which is located approximately 18 miles north of the Lenz Oil site, were obtained from the National Oceanic and Atmospheric Administration (NOAA) in Asheville, North Carolina. The NOAA provided annual data for the years 1972 through 1990, as well as monthly summaries for January 1991 through March 1992.

In addition, site-specific climate data were recorded in field logbooks on each day that field activities were conducted at the site. These data were derived from visual observations, measurements taken at the site, and daily weather reports from public sources. These qualitative climatic data were collected for health and safety purposes and were not meant to be used as part of the RI. Therefore, the site-specific data are not presented in this report.

2.7 Soil Gas Investigation

ERM-North Central performed a soil gas investigation in January 1991 to assist in the placement of downgradient monitoring wells at locations near the perimeter of the plume.

The soil gas investigation was performed in the open area to the east and southeast of the site. As shown on Figure 2-1, the sampling points were located at 50-foot intervals, along the east-west grid lines, which were spaced 100 feet apart in the north-south direction. At each sample location, a soil gas probe was driven to a depth of 36 inches or until coarse gravel, cobbles, or bedrock was encountered. Prior to sample collection, volatile organic vapors from the soil were measured by using an HNu photoionization meter. Then a known quantity of soil gas was drawn through the soil gas probe and a Teflon tube sampling train connected to an activated carbon sampling tube. The sampling tube was sent to PACE Laboratories in Minneapolis, Minnesota, for analysis of 1,2-dichloroethane, 1,2-dichloroethane (cis), 1,2-dichloroethane (trans), trichloroethene, 1,1,1-trichloroethane, toluene, and total xylenes. A total of 32 investigative samples, four field duplicate samples, two matrix spike/matrix spike duplicate (MS/MSD) sample pairs, five field blanks, and five trip blanks were collected (Table 2-1). A complete description of the soil gas sampling and analysis methodology and the limitations encountered are presented in Technical Memorandum No. 2 (Appendix C).

2.8 Soil Investigation

The objectives of the IEPA's Phase I and II soil investigations were to:

- Supplement existing information on the nature and extent of soil contamination;

- Confirm that the lateral extent of soil incineration was sufficient for the effective remediation of contaminated soil;

- Document the quality of the incinerated ash used for backfill;

- Confirm that the quality of the ash used for backfill conformed to treatment standards; and

- Determine the nature and extent of contamination in soils that were adjacent to the incinerator and the existing fire hydrant.

As shown on Table 2-2, 42 soil boring samples were collected by the IEPA during the Phase I soil investigation. Based on the rationale for sampling presented in Section 5.2 of the RI/FS Work Plan (ERM-North Central, 1990a) and Section 2.0 of the Sampling and

Analysis Plan (ERM-North Central, 1990b), the samples were analyzed for one or more of the following parameters:

- Target Compound List (TCL) VOCs,
- TCL SVOCs,
- TCL pesticides/PCBs,
- Target Analyte List (TAL) metals and cyanide, and
- Toxicity characteristic leaching procedures (TCLP) metals.

The locations of the Phase I soil borings are shown on Figure 2-2. Most of the samples were collected in accordance with the procedures described in the approved Lenz Oil RI/FS Sampling and Analysis Plan (ERM-North Central, 1990b); however, during the field activities, some of the sample collection procedures and sampling locations were modified because of field conditions. These deviations from the approved Lenz Oil RI/FS Sampling and Analysis Plan are included as Appendix D.

The Phase II soil sampling was performed by the IEPA to provide additional data needed for confirming the nature and extent of contamination. The location of the Phase II soil samples, which are shown on Figure 2-3, include: (1) some of the Phase I sampling locations that required resampling because the Phase I data were rejected, and

(2) other areas of the site that were sampled to better define the extent of residual soil contamination. The following provides a summary of the Phase II sampling efforts:

- Samples LOSB213AS, LOSB214AS, and LOSBV215AS were collected in a field, located to the north of the site across the railroad tracks, to identify the natural composition of the soil in the immediate area.

- Locations LOSB12, LOSB14, LOSB19, and LOSB22, which are situated around the main excavation area, were resampled at varied sampling intervals to fill in data gaps from the Phase I sampling. Soil borings LOSB19 and LOSB14 were redrilled at slightly different locations than in Phase I to permit the collection of samples from the specified depths prior to encountering bedrock.

- The ash pit was resampled to clarify uncertainties in the Phase I data, which resulted from the puncturing of the liner placed in the excavation. According to the RI/FS Work Plan, samples were to be taken from the soil interval exhibiting the highest readings on field instruments. All of the readings were the highest in the interval below the liner (i.e., directly beneath where the liner was punctured). Therefore, the associated laboratory results are not representative of the ash inside the excavation, and these areas were resampled during Phase II to ensure the collection of ash samples and representative results. The ash pit locations that were resampled included LOSB04, LOSB08, LOSB10, and LOSB11.

- A total of 12 soil borings were drilled in the area previously used to operate the incinerator and along the southern boundary of the site. Soil samples were collected from the 1- to 3-foot and 3- to 5-foot depth intervals; however, in a few instances an insufficient amount of material could be recovered for sampling, obstructions blocked sampling, or bedrock was encountered before the completion of the entire sampling interval.

As described in the Draft Phase IIB Work Plan (EBASCO, 1992a), five duplicate samples were collected at five different locations, five rinsate samples were also obtained from the decontaminated split spoons, and seven trip blank samples were shipped with the investigative samples. The 41 investigative soil samples collected during Phase II are summarized on Table 2-3, and their locations are shown on Figure 2-3. The Phase II soil sampling procedures are described in detail in the following subsections.

2.8.1 Background Sampling

Background soil samples were collected from the open field located to the north and across the railroad tracks from the Lenz Oil site (Figure 2-3). The samples were obtained by using a decontaminated stainless steel auger that was wrapped in aluminum foil prior to the sampling event. A separate auger was used to obtain each background sample to eliminate any potential for cross contamination.

2.8.2 Resampling Phase I Locations

The proposed (Phase I) location for LOSB12 was inside the southeastern corner of the main excavation area. However, because of the type of soil and high concentration of vapors encountered while drilling this boring, the IEPA determined that this boring was outside the excavation area. As a result, the boring was drilled in another location closer to the excavation. Although the ash material typical of the excavation was not found in the second LOSB12 boring drilled during Phase I, samples were collected from that location to characterize the soils in that area. The LOSB12 location that was originally drilled was reinvestigated during Phase II to better define the contaminants present outside the main excavation area (Figure 2-3) at two sampling intervals: 0 to 5 feet and 5 to 8.1 feet. The soil encountered in the boring consisted of dark brown clayey silt with gravel and pebbles in the first interval and tan to light grey, highly fractured weathered bedrock in the second interval. Auger refusal occurred at 8.1 feet below the surface. During the sampling, the hole was dry, and the boring was backfilled with cuttings as soon as the jars were filled.

Soil boring LOSB14 was resampled during Phase II because bedrock was encountered at shallow depths in Phase I, and no deep samples were collected at that time. The Phase II sampling location for this boring was determined in the field by the IEPA, based upon discussions with the USEPA. The Phase II sampling location of LOSB14 is approximately midway between the Phase I LOSB14 location and MW04 (Figure 2-3). The new location is approximately 22 feet from the Phase I location. Because only a sufficient amount of soil was recovered for the VOC and SVOC analyses while sampling LOSB14AS, the sample was not analyzed for metals. Because bedrock was encountered at a depth of 12.1 feet in this boring, the second sample interval terminated at 12.1 feet. Water was present in this boring at a depth of 4 feet below the ground surface after the sampling event, and the samples collected from this boring had a petroleum-like odor. The boring was backfilled with a bag of bentonite and cement, followed by cuttings.

The Phase I soil boring LOSB19 was also relocated and resampled during Phase II because bedrock had previously been encountered at a shallow depth. The Phase II location of LOSB19 was 9 feet from the fence line and south of the LOSD04 and LOSW04 sample location markers (Figure 2-3). Two samples, both LOSB19AS and LOSB19AD, were collected at a depth of 5 to 9 feet, and sample LOSB19BS was obtained at a lower interval extending from 9 feet to bedrock.

Soil boring LOSB22 was resampled at the request of USEPA. The Phase I location of the boring was easily located because the soil at LOSB22 had subsided since the previous sampling event in February 1991. The Phase II location of LOSB22 was placed within 2 feet of the Phase I boring location. Samples were collected according to the Draft Phase IIB Work Plan (EBASCO, 1992a) from the following intervals:

- Sample LOSB22AS (0 to 5 feet),
- Sample LOSB22BS (5 to 9 feet), and
- Sample LOSB22CS (9 feet to bedrock).

Composite samples were collected from each of the three depth intervals in accordance with the methodology described in Section 3.2.2 of the Draft Phase IIB Work Plan. Collecting sample material from the entire length of the split spoon assured a representative characterization of contamination in each depth interval.

2.8.3 Resampling Inside the Lined Excavation

During the Phase I investigation, the excavation liner was punctured at several locations. Soil samples were collected from these locations from below the liner and were found to contain significant concentrations of organic compounds. During the Phase II investigation, the sampling locations along the excavation walls were moved toward the center sampling point of the Phase I LOSB07 marker to eliminate the potential for puncturing the liner along the sloped sides of the excavated area. Samples were collected from LOSB04 and LOSB11, and soil boring LOSB04 was relocated 4 to 6 inches toward LOSB07 and sampled as described in the Draft Phase IIB Work Plan (EBASCO, 1992a).

Samples LOSB04AS and LOSB04AD were obtained from the 0 to 5-foot interval, and sample LOSBO4BS was collected from the lower interval of 5 to 8 feet. During the collection of LOSB04DS, the teeth of the drilling auger contained black plastic (i.e., liner material) when the auger was pulled from the boring. After sampling, the depth to water was determined to be 5.5 feet below grade. The boring was filled with 25 pounds of bentonite, followed by a bag of cement and drill cuttings. Because the liner was encountered at the bottom of the boring, the IEPA contacted the USEPA to consider raising the lower interval for those remaining three locations to avoid any further damage to the liner. Although the Draft Phase IIB Work Plan (EBASCO, 1992a) required drilling to a depth of 8 feet, the USEPA agreed that the borings could be terminated at a depth of 7.5 feet.

Samples LOSB08AS (0 to 5 feet), LOSB08BS (5 to 7.5 feet), LOSB11AS (0 to 5 feet), LOSB11AD (0 to 5 feet), and LOSB11BS (5 to 7.5 feet) were all collected in accordance with the Phase IIB Work Plan (EBASCO, 1992a). After the sampling event, the borings were filled with 25 pounds of bentonite and an unspecified quantity of cuttings, because no water was present in any of these borings.

Soil boring LOSB10 was also sampled at 0 to 5 feet and 5 to 7.5 feet. The uppermost sampling point, LOSB10AS (0 to 5 feet), had sufficient recovery to fill the required containers. However, a sufficient amount of soil was not recovered from LOSB10BS, the lower sample interval, to fill the laboratory jars for SVOC or metals analyses. Therefore, only a VOC sample was collected from this interval. The boring contained water at a 6.5-foot depth after the sampling event. The boring was sealed by placing 25 pounds of bentonite and a bag of cement in the boring, followed by the cuttings.

2.9 Surface Water Investigation

In January 1991, surface water samples were collected from the drainage ditch along the northwestern side of the Lenz Oil site. The six locations shown on Figure 2-4 were sampled during Phase I. Samples were initially collected at the downstream location SW06 and progressed upstream to minimize cross contamination. Approximately 12 to 14 inches of ice were removed from each sampling location before running water was encountered. At SW02, the IEPA observed a sheen with a strong petroleum odor on the surface of the flowing water. As shown on Table 2-4, these samples were analyzed for TCL VOCs, SVOCs, and pesticides/PCBs, TAL total metals, and cyanide by ARDL Laboratory (ARDL) in Mount Vernon, Illinois. A field blank was also collected by pouring deionized water into two VOC vials. Insufficient sample volume was available for the SVOC, metals, and cyanide analyses. The field blank was analyzed for VOCs only. A field duplicate sample was collected at sampling location SW03. The samples were collected in accordance with the procedures described in the Lenz Oil RI/FS Sampling and Analysis Plan (ERM-North Central, 1990b). Trip blanks were accidentally included with each surface water sample for shipment to the laboratory and were analyzed for VOCs. The typical ratio is 1 trip blank per sample cooler for VOCs.

The Inductively Coupled Plasma (ICP) metals (i.e., aluminum, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, silver, sodium, vanadium, and zinc) analyses of the Phase I surface water samples were rejected because of technical deficiencies in the analyses. As a result, the IEPA collected additional surface water samples from the same locations in February 1992 for laboratory analyses of only the ICP metals. The results of the TCL VOC, SVOC, and pesticide/PCB analyses of the Phase I surface water samples are acceptable and are presented in this report.

During the collection of the Phase II surface water samples, the IEPA had to break the ice on the surface to reach the running water. The downgradient sample LOSW06 was collected first, followed by LOSW05, 04, 03, 02, and 01 to minimize the potential for cross contamination. All of the samples were obtained in accordance with the approved Phase IIB Work Plan (EBASCO, 1992), and were submitted to Skinner & Sherman Laboratory, Inc. in Waltham, Massachusetts, for analysis of the ICP metals. The Phase IIB Work Plan (EBASCO, 1992) called for the collection of a duplicate surface water sample and a field blank (i.e., rinsate sample) during the Phase II sampling activities. However, because of the lack of sufficient water, the duplicate surface water sample was not collected from the ditch. In addition, a field blank was not collected during the surface water sampling because field blanks that were associated with other samples were collected before and after the surface water samples. No trip blanks were analyzed because none of the Phase II surface water samples were analyzed for VOCs.

2.10 Sediment and Surface Soil Investigation

In January 1991, sediment and soil samples were obtained from the drainage ditch located along the northwestern side of the site (Figure 2-5). One sediment and two soil samples were collected from each of six sampling cross sections along the ditch. The sediment samples were collected from the same locations as the surface water samples, and the soil samples were taken from each bank of the drainage ditch along a sampling transect perpendicular to the ditch. The samples were collected in accordance with the approved Lenz Oil RI/FS Field Sampling Plan (ERM-North Central, 1990b). All of the sediment and soil samples were analyzed by ARDL for TCL VOCs, SVOCs, pesticides/PCBs, TAL total metals, and cyanide (Table 2-5).

2.11 Geological Investigation

A geological investigation of the Lenz Oil site was performed as part of the contaminant source and ground water investigations. The objectives of the geological investigation were to:

- Define the shallow stratigraphy of the site,

- Determine the geological characteristics of the shallow deposits at the site,

- Describe the site geology in relation to the regional setting, and

- Evaluate the quality and applicability of existing geological data.

Regional geologic data were obtained from published maps and reports, and reconnaissance mapping of the site area. Site-specific geologic data were secured during the reconnaissance mapping of the site and from detailed geologic logs of the borings drilled during the contaminant source and ground water investigations. The stratigraphy of the site was described by categorizing the deposits encountered at the site into one of several facies (i.e., a stratigraphic unit that is distinguished from other stratigraphic units by its appearance and composition) and then correlating the facies across the site.

Much of the surficial aquifer below the Lenz Oil site is composed of fractured limestone and dolomite, and the fractures are a dominant factor controlling ground water flow. Therefore, ERM-North Central performed a regional fracture analysis to gather information regarding the orientation, spacing, width, lateral extent, and interconnectedness of the bedrock fractures in the vicinity of the site. The analysis included compiling data from aerial photographs, topographic maps, geologic maps, and published reports, and supplementing that data with direct field measurements.

The USGS conducted research as part of a study concerning the orientation and spacing of joint sets in the Silurian dolomite at a closed low-level radioactive waste disposal site, located approximately 1.5 miles southeast of the Lenz Oil site (Nicholas and Healy, 1988). This facet of the USGS study was performed to determine the geologic and hydrologic factors that control tritium migration. Because the Nicholas and Healy (1988) study encompassed the Lenz Oil site and included the collection of the type of data needed for the RI, it served as the primary source of fracture data. ERM-North Central also verified the USGS's findings by performing an independent fracture investigation. Between March 16 and April 17, 1991, ERM-North Central: (1) performed a reconnaissance of the area within 1.5 miles of the Lenz Oil site, (2) collected fracture data from seven outcrops, (3) plotted the data, and (4) statistically analyzed the results. The fracture analysis methodology is presented in Appendix E.

The geotechnical and hydrological characteristics of the facies at the site were determined by direct sampling and testing of soil samples from the screened intervals of the monitoring wells, as described in the Approved Lenz Oil RI/FS Sampling and Analysis Plan (ERM-North Central, 1990b). The geotechnical samples were collected between February 1991 and May 1991 and shipped under strict chain of custody to ATEC Associates, Inc. (ATEC), Indianapolis Indiana, for testing. ATEC performed the geotechnical tests in accordance with the following methods:

- Grain size analysis - ASTM Method D422-63;
- Total porosity - ASTM D0854-83; and
- Total organic carbon - USEPA Region II, Lloyd Kahn 8-27-88.

All of the geotechnical samples were collected and analyzed in accordance with the procedures described in Section 5.1 of the Approved Lenz Oil RI/FS Sampling and Analysis Plan (ERM-North Central, 1990b).

2.12 Ground Water Investigation

The ground water investigation was conducted to evaluate the nature and extent of contamination in the ground water below the site. The objectives of the ground water investigation were to:

- Determine the hydrogeologic conditions of the surficial aquifer below the site, including the vertical and horizontal flow characteristics;

- Characterize the interrelationship between the surficial aquifer and the surface water features in the vicinity of the site; and

- Determine the nature, extent, and migration characteristics of ground water contamination attributable to the site.

The foregoing investigative objectives were accomplished in accordance with the Lenz Oil RI/FS Work Plan (ERM-North Central, 1990a) by: (1) installing monitoring wells, (2) measuring the water levels in the monitoring wells and the Des Plaines River, (3) performing hydraulic conductivity tests in the monitoring wells, and (4) sampling and analyzing the ground water for hazardous constituents. The methodology used during the ground water investigation is described in the following subsections.

2.12.1 Monitoring Well Network Construction

In accordance with Section 5.1 of the Lenz Oil RI/FS Sampling and Analysis Plan (ERM-North Central, 1990b), one deep replacement monitoring well and seven monitoring well clusters, each consisting of a shallow and a deep monitoring well, were installed at the site during Phase I, Task 2. These new wells were installed downgradient of and surrounding the primary contamination source area to assess the magnitude, extent, and fate of ground water contamination at and downgradient of the site (Figure 2-6). Although preliminary locations of the monitoring wells were proposed in the Lenz Oil RI/FS Work Plan (ERM-North Central, 1990a), the proposed locations of monitoring well clusters MW-3 and MW-6 were revised after reviewing the soil gas investigation results. The USEPA and IEPA approved the revised monitoring well locations in a letter, dated February 22, 1991. The location of monitoring well cluster MW-7 was also modified in the field because numerous underground utilities were identified in the immediate vicinity of the proposed well location. The USEPA and IEPA approved moving the MW-7 cluster approximately 60 feet west of its proposed location in a letter, dated April 1, 1991. All of the other monitoring wells (MW-1, MW-2, MW-4, MW-5, and G106DR) were installed at the locations specified in the RI/FS Work Plan (ERM-North Central, 1990a).

As part of Phase II, Task 2, a shallow soil boring was installed at location G104 to identify any geologic conditions that could account for the anomalously high water levels encountered in monitoring well G104L. Because no geologic conditions were encountered that would explain the anomalous water level measurements, a shallow monitoring well (MW-8S) was installed to evaluate the hydrogeology in this area of the site. The water level readings obtained from MW-8S correlate well with the water level readings from the deep well (G104D) but not the shallow well (G104L). This suggests that the anomalous water levels in G104L are the result of poor construction of or damage to the monitoring well. Therefore, the water level data from G104L are not considered representative of the aquifer and are not being used with the other results of the RI. Because it is screened across the same strata as G104L and G104D, MW-8S was sampled instead of these two wells, neither of which was abandoned. The final monitoring well locations are shown on Figure 2-6.

The Phase I monitoring wells were installed on February 27 and April 30, 1991, and the Phase II monitoring well was installed on February 13 and 14, 1992. ERM-North Central and Fox Drilling, Inc. drilled and constructed all of the monitoring wells. The boring logs and well construction diagrams for all of the borings and wells that were drilled and installed during this RI are included in this report as Appendices F and G, respectively.

<u>Deep Monitoring Well Installation</u>

In general, the deep monitoring wells were installed in accordance with the procedures presented in Section 5.1 of the approved Sampling and Analysis Plan (ERM-North Central, 1990b). However, because of difficult drilling conditions, the actual drilling procedures deviated slightly from the approved methodology for some of the monitoring wells. For the sake of clarity, the entire drilling and monitoring well installation procedure is described in this report as follows:

- Borings were advanced to bedrock by using a CME-75 drilling rig and hollow-stem augers (HSAs). Several changes were made in the size (diameter) of the HSAs used for the first few boreholes because of problems associated with drilling through or around large subsurface boulders. Monitoring well MW-5D was initially drilled with a 6.25-inch inside diameter (I.D.) HSA and then overdrilled with an 8-inch I.D. HSA. Monitoring well MW-1D was drilled with only an 8-inch I.D. HSA, and all of the other deep monitoring wells were drilled with a 5-inch I.D. HSA.

- Soil was continuously sampled ahead of the HSA with a 2-inch-diameter, 24-inch-long split-spoon sampler). The soil was sampled and screened with an HNu photoionization detector for VOCs in accordance with the procedures outlined in the approved Sampling and Analysis Plan (ERM-North Central, 1990b). These results, which were used primarily for health and safety monitoring, were recorded in the soil boring logs included as Appendix F.

- To minimize the loss of drilling fluid (i.e., tap water from the DuPage County municipal water system) to the weathered bedrock surface and the overlying unconsolidated deposits, a temporary surface casing was seated several feet (i.e., 0.5 to 7.5 feet) into the bedrock. The temporary surface casing, which consisted of either HSAs or a steel casing with a drive shoe, was used as a conductor pipe for drilling fluids and cuttings during the coring and reaming of the bedrock. The casing was removed during the installation of the monitoring well.

- Continuous bedrock cores were drilled and collected using an NX size core barrel with a clean water wash (i.e., tap water from the DuPage County municipal water system). The bedrock cores were retained for analysis and logged by an ERM-North Central geologist, per the approved Sampling and Analysis Plan (ERM-North Central, 1990b).

- The top of the deep monitoring well screens were set approximately 30 feet below the water table and opposite a major set of bedrock fractures. After the well screen interval was selected, the borehole was reamed to 4.875 inches by using a tricone bit and a water wash rotary drilling system. The water used as the drilling fluid during the reaming activities was supplied by the DuPage County municipal water system and drawn from a fire hydrant on Jeans Road. Water usage was monitored to determine the total volume of drilling fluid lost to the formation. Any residual fluids and cuttings generated during drilling were containerized in 55-gallon drums and stored on site in the secured drum storage area.

- The well screens consisted of 2-inch-diameter, #316 stainless steel pipe with No. 10 (0.010-inch) continuous slot openings. Each deep monitoring well was constructed with a 5-foot screen and a 5.35-foot stainless steel sump. Riser pipe composed of #316 stainless steel was connected above the screen and extended to approximately 2.5 feet above grade.

The purpose of the bottom sumps was to collect any rock flour produced during the drilling of the bedrock and any silt or clay from the fracture infillings.

- The annular space around each well screen was filled with clean No. 5 quartz sand to approximately 2 feet above the top of the well screen, and a 2-foot, No. 12 silica sand collar was then placed on top of the sand pack.

- A bentonite slurry was tremied into place above the silica sand collar to a depth of 8 feet below grade prior to inserting a Portland cement/bentonite powder mixture from 2 feet to 8 feet below grade.

- After installation of the casing and annular seal, the temporary casing or augers were removed from the boring.

- A 4-inch-diameter steel protective casing with a locking steel cover was cemented into place around the riser pipe. The cement was sloped away from the casing to promote drainage away from the monitoring well. A vented polyvinyl chloride (PVC) cap was fitted over the riser, and the steel protective casing was fitted with a case-hardened, steel lock.

- All equipment and well construction materials were decontaminated with a steam cleaner between each boring.

Shallow Monitoring Well Installation

All of the shallow monitoring wells, with the exception of MW-7S, were constructed with 10-foot well screens that straddle the water table. The well screen for MW-7S was set opposite the first water encountered in the borehole (i.e., just below an impermeable confining layer of compacted fill). Because the first ground water encountered in this borehole was under confined conditions, a 5-foot well screen was set at the top of the aquifer instead of a 10-foot well screen, as specified in the Sampling and Analysis Plan (ERM-North Central, 1990b). Therefore, MW-7S is not a shallow monitoring well that intersects the water table, but rather an intermediate monitoring well that is screened at the top of a confined portion of the aquifer.

Because ground water is very shallow at most of the monitoring well locations and the shallow monitoring well screens intersect the water table, the associated construction details required some modification. In most cases, the thickness of the bentonite seal and the sand filter pack was reduced slightly to accommodate the placement of the overlying well materials. The water table at MW-6S is too shallow to use conventional aboveground protective casing that extends 2 feet below grade. Therefore, a short, flush-mounted protective casing was installed over this well to allow the well screen to be open to the uppermost ground water.

The following procedures, which deviate slightly from the procedures presented in the Sampling and Analysis Plan (ERM-North Central, 1990b), were used to construct the shallow monitoring wells:

- A 6.25-inch I.D. HSA was advanced through the unconsolidated aquifer until bedrock was encountered unless the unconsolidated portion of the aquifer was thick enough to permit the well screen to be set entirely in unconsolidated deposits. If bedrock drilling was necessary to set the well screen opposite the water table, a temporary steel casing was driven into the bedrock, and a 4.875-inch borehole was drilled by using a rotary drill bit and a clear water wash.

- Because the shallow well in each cluster was installed within 10 feet of the deep well, the geological data recorded in the soil boring log for the deep well were used to select the screened interval for the shallow well. Therefore, interval soil and/or rock samples were not obtained during the drilling of all of the shallow wells except MW-8S. The boring for MW-8S was continuously sampled because the geology at that cluster location had not been sufficiently logged by the IEPA during the installation of monitoring wells G104L and G104D.

- Geotechnical samples were collected from the screened intervals of all of the shallow wells that were set entirely in unconsolidated deposits.

- In general, a 10-foot, #316 stainless steel well screen with No. 10 (0.010-inch) continuous slot openings was set with 3 feet of the screen above the water table. Several wells were constructed with less screen above the water table because the water table is too shallow to allow the installation of 3 feet of screen above the water table and the construction of a sufficient borehole surface seal. A #316 stainless steel riser pipe was fitted above the well screen and extended to approximately 2.5 feet above grade.

- The annular space around the well screen was filled with clean No. 5 quartz sand to approximately 2 feet above the top of the well screen. If the wells were constructed entirely in unconsolidated deposits, the sand pack was placed around the screen as the HSAs were withdrawn from the boring. For several wells, the thickness of the sand pack above the top of the screen was reduced to accommodate a sufficient bentonite surface seal. As shown in the well construction diagrams for the shallow wells (Appendix G), the filter pack extends at least 0.5 of a foot above the top of the screen on all of the wells.

- Two feet of bentonite pellets were placed above the sand pack to seal the annular space around the casing. In several of the wells, the water table was near the surface, and the thickness of the bentonite seal was reduced to fit the available space.

- If space was available, a bentonite/cement grout seal was prepared from a mixture of Portland cement, bentonite powder, and clean municipal water. The grout was placed above the bentonite pellet seal by using a tremie pipe.

- A 4-inch-diameter steel protective casing with a locking steel cover was cemented into place around the riser pipe. The cement was sloped away from the casing to promote drainage away from the monitoring well. A vented PVC well cap was placed over the riser, and the steel protective casing was fitted with a case-hardened steel lock.

- All equipment and well construction materials were decontaminated with a steam cleaner between each boring.

Monitoring Well Development

Each of the monitoring wells installed during the Phase I, Task 2 and Phase II, Task 2 field investigations was developed prior to sampling. The well development procedures specified in the Sampling and Analysis Plan (ERM-North Central, 1990b) were used to develop monitoring well MW-7S. However, modified procedures were used to develop the other wells because of the large quantity of water that had to be removed from each well. The following revised well development procedures (which were approved by the USEPA and the IEPA in a letter, dated May 1, 1991) were used to develop all of the new monitoring wells except MW-7S:

- All hoses, pumps, bailers, and other equipment that were to be lowered into the wells were decontaminated by steam cleaning prior to insertion into the wells.

- The static water level and total depth were measured prior to development of each well to ensure the optimum placement of the suction point of the hose and to document the removal of sediment from the base of the well.

- To remove the water from each well, a hose was inserted in the well casing and the intake was set at the screened interval. In most cases a centrifugal pump was connected to the hose, and the development water was pumped directly into tank trucks. In accordance with standard procedures (see USEPA, 1987c and Nielson, 1991), each well was pumped until the volume of water removed was at least equal to the total amount of drilling water lost to the formation during the installation of the well, and the well yielded low-turbidity water.

- To ensure that each well was properly developed and would provide low-turbidity, representative ground water samples, an additional volume of water was removed from each well with a bailer until: (1) at least three additional well volumes had been removed; (2) the well yielded low-turbidity water; and (3) successive samples of the ground water exhibited consistent values of pH, conductivity, and temperature (i.e., pH values within 0.10 pH unit of each other, conductivity values within 10 percent of each other, and temperature values within 1.0° C of each other). These water quality parameters were measured as specified in the approved Sampling and Analysis Plan (ERM-North Central, 1990b), and the well development continued until all of these criteria were met. The total quantity of development water removed from each well is shown on Table 2-6.

ERM-North Central attempted to develop monitoring wells MW-1S, MW-5S, and MW-7S with a hand pump and a bailer because the volumes of water to be removed from these wells was relatively small. Monitoring well MW-7S was successfully developed with a hand pump and a bailer, but the other two wells were too silty to be developed by using this procedure. These wells were redeveloped with a centrifugal pump to remove the silt.

The development water from monitoring wells MW-7S and MW-8S was placed directly into 55-gallon drums and is currently stored on site in the drum storage area. This water will be treated and disposed of as part of the site remedy. The development water from the other monitoring wells (i.e., MW-1S, MW-1D, MW-2S, MW-2D, MW-3S, MW-3D, MW-4S, MW-4D, MW-5S, MW-5D, MW-6S, MW-6D, MW-7D, and G106DR) was pumped into three 8,000-gallon tank trucks and was temporarily stored on site, pending acceptance of the wastewater for treatment and disposal. A summary of the quantity of well development water placed in each of the tankers is shown on Table 2-7.

Because the DuPage County Department of Public Works-Knollwood Waste Water Treatment Plant (KWWTP) is close to the site and had accepted wastewater from the site for treatment and disposal during IEPA's Removal Action, that facility was contacted regarding the possible treatment and disposal of the development water in the tank trucks. According to the chief operator of the KWWTP, the development water could be treated and disposed of by the facility if it met the facility's contaminant limits. To evaluate the constituents in the development water, the KWWTP requested that a representative sample of the development water be analyzed for the Priority Pollutant

List (PPL) organics (including tentatively identified compounds) and inorganics, and that the data be submitted to the KWWTP chemist for review and approval.

On May 6, 1991, ERM-North Central collected a representative sample of the development water stored in the tankers and submitted it to ARDL for analysis of the TCLP parameters and the PPL organics and inorganics. The sample was collected from Tanker #2 because it contained the development water from the wells closest to the area of known on-site contamination, which would likely be the most contaminated wells. The analytical results for this sample are included as Appendix H.

The results of the TCLP analysis, which was performed to determine whether the development water was hazardous by characteristic, show that the concentrations of the constituents in the development water were well below the regulatory limits for the TCLP parameters. The PPL analytical results indicate quantities of methylene chloride; unknown VOC TICs; various naphthalene compounds; bis(2-ethylhexyl)phthalate; various unknown SVOC TICs; 1,2,3-trimethyl benzene; triethyl glycol; unknown adipates; and several metals, including barium, calcium, iron, lead, magnesium, potassium, sodium, and zinc were present in the development water. The total organic contaminant concentration, as represented by the constituents on the PPL, was 1.173 mg/L, which is well below the 2.13 mg/L limit set by the KWWTP. These results were sent to the KWWTP for their review and approval, and in a June 19, 1991 letter, the KWWTP chief chemist indicated that the development water was acceptable for treatment and discharge at the Knollwood facility. On June 24, 1991, the development water in the tank trucks was hauled to the KWWTP by Sinclair Cartage and discharged directly into the facility.

2.12.2 Well Abandonment

Monitoring wells G105S, G105D, and G106D were abandoned in accordance with the procedures required by the DuPage County Department of Public Health. These wells were abandoned per the approved Lenz Oil Work Plan because they no longer served a useful purpose in the monitoring well network and represented potential conduits for contaminant migration. Monitoring wells G105S and G105D were apparently damaged during the excavation and incineration of soil surrounding the well cluster, and G106D apparently was never completed as a monitoring well. The wells were abandoned in accordance with the Illinois Water Well Construction Code promulgated under 77 Illinois Administrative Code Part 920. As specified in the Phase II Work Plan - Part A, ERM-North Central attempted to obtain permission to abandon the Williams residential well. However, permission to abandon the well was denied by the property owner, and the well remains in service.

As discussed in Section 2.12.1, ERM-North Central drilled a soil boring and installed a shallow monitoring well (MW-8S) adjacent to G104L and G104D to evaluate potential hydrogeologic conditions that may have caused the anomalous static water levels in G104L. However, the soil boring and water level data from MW-8S do not show any hydrogeologic conditions that would explain the anomalous water level readings. Accordingly, ERM-North Central determined that the most reasonable explanation for the anomalous water level readings in G104L is damage to or poor construction of the well (i.e., the well screen and/or sand pack probably are sealed, and the well is probably being recharged by surface water runoff).

Because G104L is damaged or poorly constructed, and G104D is screened at the same depth as MW-8S, ERM-North Central determined that monitoring wells G104L and

G104D no longer serve a useful purpose in the monitoring well network. These wells have not been abandoned because they probably do not adversely affect the quality of ground water at the site. However, as indicated in a June 26, 1992 letter to the USEPA, ERM-North Central proposed that these wells be abandoned in accordance with the procedures specified in the Illinois Water Well Construction Code (77 Illinois Administrative Code 920) during the Remedial Design/Remedial Action activities.

2.12.3 Aquifer Characterization

The characteristics of the surficial aquifer at the site were evaluated to determine the direction and magnitude of ground water flow. The aquifer characterization activities performed included measuring static water levels, performing hydraulic conductivity testing, testing the aquifer materials for geotechnical parameters, and analyzing bedrock fractures at the site.

Water Level and NAPL Measurements

As described in Section 5.1.8 of the RI/FS Work Plan (ERM-North Central, 1990a), the static water level and the NAPL thickness were measured in all of the existing monitoring wells during each sampling episode and on a monthly basis during the RI field activities. Surface water elevation measurements were also taken at the stream gages installed along the Des Plaines River and the drainage ditch at least once every month from January 1991 through March 1992. All of the water level measurements were taken in accordance with the procedures outlined in Section 6.1 of the Lenz Oil RI/FS QAPP (ERM-North Central, 1990c). Each well and stream gage was marked with a reference point from which the water level and depth measurements were taken. The reference point elevation of each well and stream gage was established by Patrick

Engineering, Inc., a licensed Illinois surveyor, with respect to the U.S. Datum Mean Sea Level elevation. Thus, all of the water level measurements are expressed in feet AMSL.

Hydraulic Conductivity Testing

ERM-North Central performed in situ hydraulic conductivity testing of all of the monitoring wells at the Lenz Oil site with the exception of G104L, G106L, and MW-8S from May 23, 1991 to May 30, 1991. These three wells were not tested for the following reasons:

- G104L - Casing deformities prevented: (1) the air pressure testing equipment from sealing correctly, and (2) the solid slug from passing freely into and out of the water column.

- G106L - Free product that was present in the monitoring well could potentially: (1) damage the testing equipment (i.e., the pressure transducer); and (2) make the interpretation of the recovery data unreasonably complex.

- MW-8S - The well was not installed at the time the testing was performed.

Because sufficient data was gathered from the remaining wells to characterize hydraulic conductivities at the site further unplanned attempts using unapproved methodologies were not conducted.

Rising head and falling head slug tests were performed during Phase I. Falling head slug tests were conducted in all of the monitoring wells in which the water table was within 4 feet of the well screen (i.e., monitoring wells MW-1S, MW-2S, MW-3S, MW-4S, G101M, G101D, G101L, G102L, MW-5S, MW-6S, and MW-7S). The following procedures were used for performing the falling head slug tests in these wells:

- The pretest static water level was measured in the well.

- A pressure transducer was inserted below the static water level, sufficiently deep to avoid contact with the slug upon insertion.

- A slug, a calibrated cylinder of known volume, was instantaneously inserted into the well below the static water table.

- Data pairs of time versus water level were recorded by using a pressure transducer and a computer data collection system.

- Readings were taken at the following time intervals: 0.2 seconds from 0 to 2 seconds, 1 second from 2 to 20 seconds, 5 seconds from 20 to 120 seconds, 0.5 minutes from 2 to 10 minutes, and 2 minutes from 10 to 100 minutes.

- The results were analyzed in the field to determine whether these data were sufficient and reliable to enable the computation of hydraulic conductivity.

Rising head pressure tests were performed in all of the monitoring wells whose well screens were submerged at least 2 feet below the water table. Specifically, rising head tests were conducted in monitoring wells MW-1D, MW-2D, MW-3D, MW-4D, MW-5D, MW-6D, MW-7D, G106DR, G102D, and G104D. The rising head pressure test method was selected because published hydraulic conductivity values for the Silurian dolomite aquifer were generally too high to be effectively measured by using conventional slug test methods. The pressure test introduces a larger initial change in the head than the slug test and, thus, allows recovery data to be collected over a longer period of time. However, this method can only be used on airtight wells in which the static water level can be depressed by using air pressure. Leaky wells and wells screened opposite the water table cannot be tested by the air pressure method, which was performed in accordance with the following:

- The ambient air was monitored with a HNu volatile organic detector to ensure that the air introduced into the borehole was free of VOCs.

- The pretest static water level was measured in the well and an airtight well head adaptor was then attached to the wellhead. The well head adapter sealed the top of the wells to ensure that the air pressure in the well could be increased to displace the static water level. The transducer cable was then placed through the well head adaptor to a depth of at least 4.5 feet below the static water level in the well.

- A small pump was then attached to the well head, and ambient air was pumped into the well. The air pressure in the well was increased until the water level in the well was pushed down 48 inches. The well was then allowed to stabilize at this water level and applied air pressure.

- If a well could not be pressurized, it was considered "leaky," and the test was terminated. Only G104L failed this test.

- The data collection computer program was started, and a graphic display was generated to show that the transducer was working properly. The graphic display illustrated the water level in the well relative to the transducer depth.

- After the water level stabilized, the air pressure was instantaneously released in the well, and the change in water level with time was recorded by using the computer data collection system. The recovery was plotted on the computer screen to permit an evaluation of the results in these field to determine whether these data were sufficient and reliable.

- After the water level fully recovered, these data were stored in the computer for later analysis.

The data collection equipment was calibrated each day, and a span check was performed before each test. All of the test data were stored on a computer disk for later analysis. The various types of testing equipment that were inserted in the wells (i.e., the transducer, downhole cable, and wellhead adaptor) were decontaminated prior to and between each test by using an Alconox wash and a distilled water rinse.

Three of the monitoring wells were retested to examine the precision of the calculated hydraulic conductivity values. The results of the in situ hydraulic conductivity testing, which were analyzed by the Bouwer and Rice (1976) method are presented and discussed in Appendix I.

Site-Specific Bedrock Fracture Analysis

After rock coring was completed at each boring, the core was logged by an ERM-North Central geologist according to the methods described in Section 5.1 of the Sampling and Analysis Plan (ERM-North Central, 1990b). The depth, thickness, and apparent angle of each bedrock fracture were noted on the boring logs, and a summary presentation of all the fracture data was prepared to permit an interpretation of the nature and extent of the fractures. The fracture analysis methodology and results are presented in Appendix E.

Geotechnical Sampling and Testing

Geotechnical samples were collected from monitoring well locations MW-1S, MW-2S, MW-4S, and MW-5S. Samples were obtained from the unconsolidated soil in the screened interval of each well according to the procedures specified in Section 5.1 of the Sampling and Analysis Plan (ERM-North Central, 1990b). The samples were tested for grain size, total porosity, and total organic carbon by ATEC by using the methods specified in Appendix E of the QAPP (ERM-North Central, 1990c). Because MW-3S, MW-6S, and MW-7S were screened in bedrock, geotechnical samples could not be collected from these monitoring well borings. The results of the geotechnical testing are presented and discussed in Appendix J.

2.12.4 Ground Water Sampling

Two rounds of ground water samples were collected at the Lenz Oil site during the RI. The Round One sampling event was performed between May 6 and May 9, 1991 and included the collection of 23 investigative ground water samples, one NAPL sample, three field blanks, three field duplicates, two MS/MSD and four trip blanks (Table 2-8). The Round Two sampling event was performed between February 6 and February 9, 1992 and included the collection of 23 investigative ground water samples, two NAPL samples, four field blanks, four field duplicates, two MS/MSDs, and four trip blanks (Table 2-9). The well locations for Rounds One and Two of ground water samples are shown in Figures 2-7 and 2-8, respectively. The monitoring well locations and screen depths were designed to define the nature and extent of ground water contamination attributable to the Lenz Oil site.

Both rounds of ground water samples were collected in accordance with the procedures specified in Section 5.2 of the approved Sampling and Analysis Plan (ERM-North Central, 1990b). Prior to sampling, static water level measurements were obtained, and standing water was removed by purging each well until stabilization of temperature, pH, and specific conductance was achieved. Dedicated Teflon bailers were used for purging and sample collection. The bailers were first decontaminated by using either steam cleaning or an Alconox wash, followed by a rinse with potable water and a double rinse with distilled water.

Ground water samples were transferred directly from the dedicated bailer to bottles that were provided by the analytical laboratories. The ground water sample containers were filled at each well in the following sequence: VOCs, followed by SVOCs, pesticides/PCBs, total metals, dissolved metals, and cyanide.

The NAPL samples were collected as follows:

- All equipment inserted into the well was decontaminated in accordance with procedures presented in Section 5.2 of the approved Sampling and Analysis Plan (ERM-North Central, 1990b).

- The depth to water and the depth to the NAPL were measured by using an interface probe.

- A clear, bottom filling, dedicated Teflon bailer with a bottom emptying pipette was used to withdraw the sample.

- Aqueous phase liquids were drained from the bailer through the pipette into a steel drum.

- The NAPL samples were transferred directly from the dedicated bailer to the appropriate sample containers in the following order: (1) VOC, (2) SVOC, (3) pesticide/PCB, (4) total metals, (5) cyanide, (6) TCLP, (7) viscosity, and (8) specific gravity. As stipulated in the Lenz Oil RI/FS QAPP Addendum (ERM-North Central, 1992a), no preservatives were used.

As specified in the approved Sampling and Analysis Plan (ERM-North Central, 1990b), the field blank samples were collected by pouring distilled water through a decontaminated, dedicated bailer prior to filling the investigative sample containers.

Duplicate and MS/MSD samples were collected by alternately filling the investigative and duplicate (or MS/MSD) sample bottles.

Immediately after the sample containers were filled, the containers were placed in a cooler and cooled with ice. Glass vials for VOC analysis were filled with zero headspace (i.e., no air bubbles). Samples collected for dissolved metals were field filtered by using a Geotech disposal filter with a pore size of 0.45 microns. The preservation of the samples was performed in accordance with the Lenz Oil RI/FS QAPP (ERM-North Central, 1990c) and the QAPP Addendum (ERM-North Central, 1992a).

Ground water and NAPL samples collected during the RI were identified with the following information:

- Name of Site (LO);
- Sampling Round Number (1,2);
- Monitoring Well Identification (e.g., MW01, or 01, G102, or 102)
- Depth Modifier (e.g., S for shallow well, D for deep well, etc.);
- Sample Matrix (e.g., GW for ground water, RW for residential well, WO for NAPL); and

- Quality Assurance/Quality Control (QA/QC) Modifiers (FB for field blank, FD for field duplicate, TB for trip blank, or MS/MSD;.

For example, the Round One duplicate sample collected from monitoring well MW-04S was identified as LO-1MW04S-FD, and the Round Two NAPL sample collected from monitoring well G106S was identified as LO-2106S-WO. Field data forms were completed for each ground water and NAPL sample, as indicated in Section 2.2 of the Data Management Plan (ERM-North Central, 1990d). Copies of the completed forms for the Phase I and Phase II ground water and NAPL sampling are included as Appendix K of this report.

Chain-of-custody, sample tracking, and sample analysis request forms were completed for each sample cooler shipped to the laboratory. These forms were used to ensure the proper chain of custody and the completion of the correct sample analyses, as described in the Data Management Plan (ERM-North Central, 1990d).

All of the sample container labels and other sample tracking forms were completed in accordance with Section 3.0 of the Data Management Plan (ERM-North Central, 1990d).

The Round One ground water samples were analyzed by ARDL in a manner consistent with Routine Analytical Service (RAS) Contract Laboratory Program (CLP) methods specified in the 2/88 Statement of Work (SOW) for organics and the 7/88 SOW for inorganics. As shown in Table 2-7, the samples were analyzed for TCL VOCs, SVOCs, and pesticides/PCBs; TAL dissolved and total metals; and cyanide. The Round One ground water sample analyses are summarized in Table 2-8.

The Round Two ground water samples were analyzed for: TCL VOCs, SVOCs, and pesticides/PCBs in accordance with the CLP SOW OLM01.0 for organics, as well as TAL dissolved and total metals and total cyanide according to the CLP SOW ILM01.0 for inorganics. ARDL analyzed the VOC fraction; RMAL of Arvada, Colorado, tested the SVOC and pesticides/PCB fraction; and Skinner and Sherman, located in Waltham, Massachusetts, analyzed the inorganic fractions. The Round Two ground water sample analyses are summarized in Table 2-9.

A ground water sample was collected during Round Two from the Corwin Lenz residential well. CompuChem Laboratory completed the TCL VOCs, SVOCs, and pesticide/PCBs analyses, and Warzyn Laboratory, located in Madison, Wisconsin, performed the TAL dissolved and total metals as well as the total cyanide analyses. Appropriate field blank and duplicate samples were collected as described in Section 5.2 of the approved Sampling and Analysis Plan (ERM-North Central, 1990b) and analyzed by using the low detection limits method specified in the QAPP Addendum (ERM-North Central, 1990a).

Two NAPL samples were collected during Round Two from MW-5S and MW-6S and analyzed as medium concentration samples for: (1) TCL VOCs, SVOCs, and pesticides/PCBs; (2) TAL total metals and cyanide; (3) TCLP organics and inorganics; (4) specific gravity; and (5) viscosity. The chemical properties were analyzed by RMAL, and the physical properties were analyzed by Hauser Laboratory of Boulder, Colorado. With the exception of the TAL total metals analyses, the NAPL analyses were performed in accordance with the procedures specified in the QAPP Addendum (ERM-North Central, 1992a). The NAPL samples analyzed for TAL total metals were inadvertently prepared using the TCLP preparation procedure. However, because the NAPL is a liquid, the sample preparation was very similar to the standard CLP preparation, and the resulting data are usable. The NAPL samples were collected in accordance with procedures specified in the Phase II Work Plan - Part A (ERM-North Central, 1991a). However, there was an insufficient volume of NAPL in monitoring well G106L to collect both an investigative sample and a duplicate sample. Therefore, at the request of the USEPA, investigative NAPL samples were collected from monitoring wells G106L and MW-5S, and no duplicate NAPL samples were collected.

2.13 Human Population Survey

Human population data for Lemont, Illinois, and the surrounding communities were obtained from the DuPage County Development Commission. The population data are based on the 1990 Census.

2.14 Ecological Investigation

The ecological investigation of the site consisted of: (1) identifying the nearby wetlands, and (2) identifying the animals present near the site. Wetlands, which are defined as low lying marshy areas for the purpose of this investigation, were identified from aerial photographs and topographic maps of the area. The wetlands were not classified according to biota. The animals present on or near the site were identified from observation made during the field activities. Also, the Illinois Department of Conservation Natural Heritage Database was accessed to determine the presence of Federal- or State-listed endangered/threatened species in the immediate vicinity of the Lenz Oil site.

2.15 Summary of Technical Memoranda

Table 2-10 summarizes the Lenz Oil RI/FS Technical Memoranda that were prepared and submitted in accordance with the approved Work Plan (ERM-North Central, 1990a). This table presents the memoranda section titles and brief content summaries.

TABLES

TABLE 2-1

SOIL GAS SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 1 of 2)

Sample I.D.[1]	Location Coordinates	Probe Depth (inches)	Selected Volatile Organic Compounds[2]
LO-1A1-SG	4+00N, 7+00E	36	X
LO-1A2-SG	4+00N, 6+50E	18	X
LO-1A3-SG	4+00N, 6+00E	18	X
LO-1A4-SG	4+00N, 5+50E	18	X
LO-1A5-SG	4+00N, 5+00E	34	X
LO-1A6-SG	4+00N, 4+50E	18	X
LO-1A7-SG	4+00N, 4+00E	35	X
LO-1A8-SG	4+00N, 3+50E	28	X
LO-1A9-SG	4+00N, 3+00E	36	X
LO-1B1-SG	3+00N, 7+00E	18	X
LO-1B2-SG	3+00N, 6+50E	18	X
LO-1B3-SG	2+90N, 6+00E	16	X
LO-1B4-SG	3+00N, 5+50E	18	X
LO-1B5-SG	3+00N, 5+10E	18	X
LO-1B6-SG	3+15N, 4+55E	18	X
LO-1B7-SG	3+00N, 4+00E	18	X
LO-1B8-SG	3+00N, 3+50E	18	X
LO-1B9-SG	3+00N, 3+00E	19	X
LO-1C1-SG	2+00N, 6+95E	18	X
LO-1C2-SG	2+00N, 6+50E	18	X
LO-1C3-SG	2+00N, 6+00E	18	X
LO-1C4-SG	2+00N, 5+50E	18	X
LO-1C5-SG	2+00N, 5+00E	18	X
LO-1C6-SG	2+00N, 4+50E	18	X
LO-1C7-SG	2+00N, 4+00E	18	X
LO-1C8-SG	2+00N, 3+50E	18	X
LO-1C9-SG	2+00N, 3+00E	18	X
LO-1C10-SG	2+00N, 2+50E	18	X
LO-1C11-SG	1+80N, 2+20E	18	X
LO-1C12-SG	2+00N, 1+50E	18	X
LO-1C13-SG	2+00N, 1+00E	18	X
LO-1CD14-SG	1+50N, 0+75E	18	X
LO-1A4-SGFS	4+00N, 5+50E	20	X
LO-1A5-SGFS	4+00N, 5+00E	34	X
LO-1C6-SGFS	2+00N, 4+50E	18	X

TABLE 2-1

SOIL GAS SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 2 of 2)

Sample I.D.[1]	Location Coordinates	Probe Depth (inches)	Selected Volatile Organic Compounds[2]
LO-1C10-SGFS	2+00N, 2+50E	18	X
LO-1A8-SGMS	4+00N, 3+50E	30	X
LO-1A8-SGMSD	4+00N, 3+50E	30	X
LO-1B8-SGMS	3+00N, 3+50E	18	X
LO-1B8-SGMSD	3+00N, 3+50E	18	X
LO-1A1-SGFB	4+00N, 7+00E	NA	X
LO-1B8-SGFB	3+00N, 3+50E	NA	X
LO-1B9-SGFB	3+00N, 3+00E	NA	X
LO-1C1-SGFB	2+00N, 6+95E	NA	X
LO-1C4-SGFB	2+00N, 5+50E	NA	X
LO-1C10-SGFB	2+00N, 2+50E	NA	X
LO-1A1-SG-TB1	NA	NA	X
LO-1-SG-TB2	NA	NA	X
LO-1-SG-TB3	NA	NA	X

Key:

NA = Not applicable.

Notes:

(1) The sample identification suffixes designate the type of sample collected as follows:

X = Analysis performed
SG = Soil gas investigative sample
SGFS and SGFD = Soil gas field duplicate sample
SGMS = Soil gas matrix spike sample
SGMSD = Soil gas matrix spike duplicate sample
SGFB = Soil gas field blank sample
TB = Trip blank

(2) 1,2-Dichloroethane
1,2-Dichloroethene (cis)
1,2-Dichloroethene (trans)
Trichloroethene
1,1,1-Trichloroethane
Toluene
Xylenes (total)

TABLE 2-2

PHASE I SOIL SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 1 of 2)

Soil Boring No.	Sample Depth Interval (feet)	Laboratory Analyses Conducted				
		TCLP Metals	TAL Metals and Cyanide	TCL VOCs	TCL SVOCs	TCL Pest/PCBs
SB01	0-5			X	X	X
SB01	5-9			X	X	X
SB01	9.5-12.5			X		
SB02	0-5			X	X	X
SB02	5-7.5			X	X	X
SB02	7.5-8.7			X	X	X
SB03	0-5			X	X	X
SB04	0-2.5	X				
SB04	2.5-5	X				
SB05	2.5-5	X				
SB05	5-9	X	X	X	X	X
SB06	2.5-5	X				
SB06	5-9	X	X	X	X	X
SB07	2.5-5	X				
SB07	5-9	X	X	X	X	X
SB08	0-2.5	X				
SB08	2.5-5	X				
SB09	2.5-5	X				
SB09	5-7	X	X	X	X	X
SB10	0-2.5	X				
SB10	2.5-5	X				
SB11	0-2.5	X				
SB11	2.5-5	X				
SB12A	2.5-5	X	X	X	X	X
SB13	0-1.7		X	X	X	X
SB14	0-4.5		X	X	X	X
SB15	2.5-4.5		X	X	X	X
SB15	4.5-9		X	X	X	X
SB16	0-4.5		X	X	X	X
SB17	0-3.8		X	X	X	X
SB18	0-5		X	X	X	X
SB18	7.5-9.5		X	X	X	X
SB18	9.5-12.5		X	X	X	X
SB19	0-2.6		X	X	X	X
SB20	0-5		X	X	X	X
SB20	4.5-9.5		X	X	X	X
SB20	9.5-12.5		X	X	X	X
SB21	2.5-5			X	X	X
SB21	9.5-14.5			X	X	X
SB22	0-5			X	X	X
SB22	7.5-9.5			X		
SB23	2.8-4.5		X	X	X	X

TABLE 2-2

PHASE I SOIL SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 2 of 2)

Soil Boring No.	Sample Depth Interval (feet)	Laboratory Analyses Conducted				
		TCLP Metals	TAL Metals and Cyanide	TCL VOCs	TCL SVOCs	TCL Pest/PCBs
SB06D (Duplicate)	2.5-5	X				
SB15D (Duplicate)	2.5-4.5	X	X	X	X	X
SB2020D (Duplicate)	4.5-9.5		X	X	X	X
TB (Blank)				X		

Key:

TCLP Metals = Toxicity Characteristic Leaching Procedure metals
TAL Metals and Cyanide = Target Analyte List total metals and cyanide
TCL VOCs = Target Compound List volatile organic compounds
TCL SVOCs = Target Compound List semivolatile organic compounds
TCL Pest/PCBs = Target Compound List pesticides and polychlorinated biphenyls
Blank Space = Analysis not performed.
X = Analysis performed
TB = Trip blank

TABLE 2-3

PHASE II SOIL SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 1 of 2)

IEPA Sample Number	Sample Depth Interval (feet)	Laboratory Analyses Performed			
		TAL Metals and Cyanide	TCL VOCs	TCL SVOCs	TCL Pest/PCBs
LOSB201AS	0-3	X	X	X	X
LOSB201BS	3-5	X	X	X	X
LOSB202AS	0-3	X	X	X	X
LOSB202AS	3-5	X	X	X	X
LOSB203AS	0-3	X	X	X	X
LOSB203BS	3-5		X	X	X
LOSB204AS	0-3	X	X	X	X
LOSB204BS	3-5	X	X	X	X
LOSB205AS	0-3	X	X	X	X
LOSB205BS	3-5	X	X	X	X
LOSB206AS	0-3	X	X	X	X
LOSB207AS	0-3	X	X	X	X
LOSB207BS	3-5	X	X	X	X
LOSB208AS	0-3	X	X	X	X
LOSB208BS	3-5	X	X	X	X
LOSB209AS	0-3	X	X	X	X
LOSB209BS	3-5	X	X	X	X
LOSB211AS	0-3	X	X	X	X
LOSB211BS	3-5	X	X	X	X
LOSB212AS	0-3	X	X	X	X
LOSB212BS	3-5				
LOSB04AS	0-5	X	X	X	X
LOSB04BS	5-8	X	X	X	X
LOSB08AS	0-5	X	X	X	X
LOSB08BS	5-8	X	X	X	X
LOSB10AS	0-5	X	X	X	X
LOSB10BS	5-8		X	X	
LOSB11AS	0-5	X	X	X	X
LOSB11BS	5-8	X	X	X	X
LOSB12AS	0-5	X	X	X	X
LOSB12BS	5-8.1	X	X	X	X
LOSB14AS	5-10		X	X	X
LOSB14BS	10-12.1	X	X	X	X
LOSB19AS	5-10	X	X	X	X
LOSB19BS	10-11.5	X	X	X	X
LOSB22AS	0-5	X	X	X	X
LOSB22BS	5-10	X	X	X	X
LOSB22CS	10-15	X	X	X	X
LOSB213AS (BG)	N/A	X	X	X	X
LOSB214AS (BG)	N/A	X	X	X	X
LOSB215AS (BG)	N/A	X	X	X	X

TABLE 2-3

PHASE II SOIL SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS

(Page 2 of 2)

IEPA Sample Number	Sample Depth Interval (feet)	Laboratory Analyses Performed			
		TAL Metals and Cyanide	TCL VOCs	TCL SVOCs	TCL Pest/PCBs
LOSB208AD (Duplicate)	0-3	X	X	X	X
LOSB04AD (Duplicate)	0-5	X	X	X	X
LOSB11AD (Duplicate)	0-5	X	X	X	X
LOSB19AD (Duplicate)	5-10	X	X	X	X
LOSB22BD (Duplicate)	5-10	X	X	X	X
LOSB203BR (Rinsate)	N/A	X	X	X	X
LOSB04BR (Rinsate)	N/A	X	X	X	X
LOSB08AR (Rinsate)	N/A	X	X	X	X
LOSB12BR (Rinsate)	N/A	X	X	X	X
LOSB19BR (Rinsate)	N/A	X	X	X	X
TB/S'FIELD (Blank)	N/A		X		
TRIP BLK1 (Blank)	N/A		X		
TRIP BLK2 (Blank)	N/A		X		
TRIP BLK3 (Blank)	N/A		X		
TRIP BLK4 (Blank)	N/A		X		
TRIP BLK1 (Blank)	N/A		X		
TRIP BLK2 (Blank)	N/A		X		

Key:

TAL Metals and Cyanide	=	Target Analyte List total metals and cyanide
TCL VOCs	=	Target Compound List volatile organic compounds
TCL SVOCs	=	Target Compound List semivolatile organic compounds
TCL Pest/PCBs	=	Target Compound List pesticides and polychlorinated biphenyls
X	=	Analysis performed
Blank space	=	Analysis not performed
N/A	=	Not applicable
BG	=	Background

Note:

Not all samples were analyzed for all parameters. Only those analyses performed on the samples are listed.

TABLE 2-4

SURFACE WATER SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS

IEPA Sample Number	Laboratory Analyses Performed			
	TAL Metals and Cyanide	TCL VOCs	TCL SVOCs	TCL Pest/PCBs
Phase I Samples:				
SW01	X	X	X	X
SW02	X	X	X	X
SW03	X	X	X	X
SW04	X	X	X	X
SW05	X	X	X	X
SW06	X	X	X	X
SW03FD (Duplicate)	X	X	X	X
SW01TB (Blank)		X		
SW02FB (Blank)		X		
SW02TB (Blank)		X		
SW03TB (Blank)		X		
SW03FDTB (Blank)		X		
SW04TB (Blank)		X		
SW05TB (Blank)		X		
SW06TB (Blank)		X		
Phase II Samples:[1]				
SW01	X			
SW02	X			
SW03	X			
SW04	X			
SW05	X			
SW06	X			

Note:

(1) The Phase II surface water samples were analyzed for the Inductively Coupled Plasma (ICP) metals only because the results of these analyses from the Phase I samples were rejected for not achieving the data quality objectives.

Key:

TAL Metals and Cyanide	= Target Analyte List total metals and cyanide
TCL VOCs	= Target Compound List volatile organic compounds
TCL SVOCs	= Target Compound List semivolatile organic compounds
TCL Pest/PCBs	= Target Compound List pesticides and polychlorinated biphenyls
X	= Analyses performed
Blank space	= Analysis not performed
FB	= Field Blank
FD	= Field Duplicate
TB	= Trip Blank

TABLE 2-5

SEDIMENT SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS

IEPA Sample Number	Laboratory Analyses Performed			
	TAL Metals and Cyanide	TCL VOCs	TCL SVOCs	TCL Pest/PCBs
SD01	X	X	X	X
SD02	X	X	X	X
SD03	X	X	X	X
SD04	X	X	X	X
SD05	X	X	X	X
SD06	X	X	X	X
SS01A	X	X	X	X
SS01B	X	X	X	X
SS02A	X	X	X	X
SS02B	X	X	X	X
SS03A	X	X	X	X
SS03B	X	X	X	X
SS04A	X	X	X	X
SS04B	X	X	X	X
SS05A	X	X	X	X
SS05B	X	X	X	X
SS06A	X	X	X	X
SS06B	X	X	X	X
SD05FD (Duplicate)	X	X	X	X
SS04BFD (Duplicate)	X	X	X	X
SS06BFD (Duplicate)	X	X	X	X
SD01TB (Blank)		X		
SD06FB (Blank)	X	X		
SS06BFB (Blank)	X	X	X	X

Key:

TAL Metals and Cyanide	= Target Analyte List total metals and cyanide
TCL VOCs	= Target Compound List volatile organic compounds
TCL SVOCs	= Target Compound List semivolatile organic compounds
TCL Pest/PCBs	= Target Compound List pesticides and polychlorinated biphenyls
X	= Analyses performed
Blank space	= Analysis not performed
FB	= Field Blank
FD	= Field Duplicate
TB	= Trip Blank

TABLE 2-6

DEVELOPMENT WATER REMOVAL SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS

Well Number	Total Drilling Fluids Lost to Formation (gal)	Total Development Water Pumped from Well (gal)
MW-1S	0	360
MW-1D	1525	1850
MW-2S	10	205
MW-2D	1630	1650
MW-3S	358	360
MW-3D	3500	3530
MW-4S	400	415
MW-4D	3000	3075
MW-5S	0	90
MW-5D	1865	1920
MW-6S	150	180
MW-6D	800	825
MW-7S	50	50
MW-7D	549	650
G106DR	1022	1030
MW-8S	1150	1200

TABLE 2-7

SUMMARY OF TANK TRUCK CONTENTS[1,2]
LENZ OIL SITE
LEMONT, ILLINOIS

Monitor Well No.	Gallons Pumped Into Tanker #1	Gallons Pumped Into Tanker #2	Gallons Pumped Into Tanker #3
MW-1S		360	
MW-1D		1,850	
MW-2S	205		
MW-2D	1,650		
MW-3S			360
MW-3D			3,530
MW-4S		415	
MW-4D	3,075		
MW-5S		90	
MW-5D		1,920	
MW-6S			180
MW-6D		825	
MW-7D			650
G106DR			1,030

Notes:

(1) Quantities are estimates based upon field notes and meter readings.

(2) MW-7S and MW-8S were developed by hand, and the well development water from these two wells is stored on site in drums.

TABLE 2-8

ROUND ONE GROUND WATER SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 1 of 2)

ERM Sample Number	Laboratory Analyses Conducted					
	TCL VOCs	TCL SVOCs	TCL PEST/PCBs	Total TAL Metals	Dissolved TAL Metals	Cyanide
LO-1MW01S-GW	X	X	X	X	X	X
LO-1MW01D-GW	X	X	X	X	X	X
LO-1MW02S-GW	X	X	X	X	X	X
LO-1MW02D-GW	X	X	X	X	X	X
LO-1MW03S-GW	X	X	X	X	X	X
LO-1MW03D-GW	X	X	X	X	X	X
LO-1MW04S-GW	X	X	X	X	X	X
LO-1MW04D-GW	X	X	X	X	X	X
LO-1MW05S-GW	X	X	X	X	X	X
LO-1MW05D-GW	X	X	X	X	X	X
LO-1MW06S-GW	X	X	X	X	X	X
LO-1MW06D-GW	X	X	X	X	X	X
LO-1MW07S-GW	X	X	X	X	X	X
LO-1MW07D-GW	X	X	X	X	X	X
LO-1G101L-GW	X	X	X	X	X	X
LO-1G101M-GW	X	X	X	X	X	X
LO-1G101D-GW	X	X	X	X	X	X
LO-1G102L-GW	X	X	X	X	X	X
LO-1G102D-GW	X	X	X	X	X	X
LO-1G104L-GW	X	X	X	X	X	X
LO-1G104D-GW	X	X	X	X	X	X
LO-1G106DR-GW	X	X	X	X	X	X
LO-1G106S-WO (Aqueous Layer)[1]	X	X		X	X	X
LO-1G106S-WO (Oil Layer)[1]		X	X	X	X	X
LO-1MW03S-FD (Duplicate)	X	X	X	X	X	X
LO-1MW04S-FD (Duplicate)	X	X	X	X	X	X
LO-1MW05S-FD (Duplicate)	X	X	X	X	X	X
LO-1MW02S-MS/MSD	X	X	X			
LO-1G106DR-MS/MSD	X	X	X			
LO-1GW1-FB (Blank)	X	X	X	X	X	X
LO-1GW2-FB (Blank)	X	X	X	X	X	X
LO-1GW3-FB (Blank)	X	X	X	X	X	X
LO-GW6-TB (Blank)	X					
LO-1GW-TB1 (Blank)	X					
LO-1GW-TB (Blank)	X					
LO-1GW-TB3 (Blank)	X					

TABLE 2-8

ROUND ONE GROUND WATER SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 2 of 2)

Note:

(1) According to the chain-of-custody form for sample LO-1G106S-WO, TCL VOC and TCL PEST/PCB analyses were requested for both the aqueous and oil fractions of the sample. However, the TCL VOC analysis was not performed on the oil fraction, and the TCL PEST/PCB analysis was not performed on the aqueous fraction as a result of laboratory error.

Key:

TCL VOCs	=	Target Compound List volatile organic compounds
TCL SVOCs	=	Target Compound List semivolatile organic compounds
TCL PEST/PCBs	=	Target Compound List pesticide/polychlorinated biphenyls
Total TAL Metals	=	Total Target Analyte List metals
Dissolved TAL Metals	=	Dissolved Target Analyte List metals
X	=	Analysis performed
Blank space	=	Analysis not performed
NAPL	=	Nonaqueous phase liquid

TABLE 2-9

ROUND TWO GROUND WATER SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 1 of 2)

ERM Sample Number	Laboratory Analyses Conducted								
	TCL VOCs	TCL SVOCs	TCL PEST/PCBs	Total TAL Metals	Dissolved TAL Metals	Cyanide	TCLP	Specific Gravity	Viscosity
LO-201S-GW	X	X	X	X	X	X			
LO-201D-GW	X	X	X	X	X	X			
LO-202S-GW	X	X	X	X	X	X			
LO-202D-GW	X	X	X	X	X	X			
LO-203S-GW	X	X	X	X	X	X			
LO-203D-GW	X	X	X	X	X	X			
LO-204S-GW	X	X	X	X	X	X			
LO-204D-GW	X	X	X	X	X	X			
LO-205S-GW	X	X	X	X	X	X			
LO-205D-GW	X	X	X	X	X	X			
LO-206S-GW	X	X	X	X	X	X			
LO-206D-GW	X	X	X	X	X	X			
LO-207S-GW	X	X	X	X	X	X			
LO-207D-GW	X	X	X	X	X	X			
LO-208S-GW	X	X	X	X	X	X			
LO-2101L-GW	X	X	X	X	X	X			
LO-2101M-GW	X	X	X	X	X	X			
LO-2101D-GW	X	X	X	X	X	X			
LO-2102L-GW	X	X	X	X	X	X			
LO-2102D-GW	X	X	X	X	X	X			
LO-2106DR-GW	X	X	X	X	X	X			
LO-2106S-GW		X	X	X	X	X			
LO-2-RES1-RW	X	X	X	X	X	X			
LO-205S-WO (NAPL)	X	X	X	X		X	X	X	X
LO-2106S-WO (NAPL)	X	X	X	X		X	X	X	X
LO-204S-GWDUP (Duplicate)	X	X	X	X	X	X			
LO-208S-GWDUP (Duplicate)	X	X	X	X	X	X			
LO-203S-GWDUP (Duplicate)	X	X	X	X	X	X			
LO-2-RES1-RWDUP (Duplicate)	X	X	X	X	X	X			
LO-201S-MS/MSD	X	X	X						
LO-2106DR-MS/MSD	X	X	X						

TABLE 2-9

ROUND TWO GROUND WATER SAMPLE ANALYSIS SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 2 of 2)

ERM Sample Number	Laboratory Analyses Conducted								
	TCL VOCs	TCL SVOCs	TCL PEST/PCBs	Total TAL Metals	Dissolved TAL Metals	Cyanide	TCLP	Specific Gravity	Viscosity
LO-201S-FB (Blank)	X	X	X	X	X	X			
LO-208S-FB (Blank)	X	X	X	X	X	X			
LO-203S-FB (Blank)	X	X	X	X	X	X			
LO-2-RES1-FB (Blank)	X	X	X	X	X	X			
LO-2-TB1 (Blank)	X								
LO-2-TB2 (Blank)	X								
LO-2-TB4 (Blank)	X								
LO-2-TB5 (Blank)	X								

Key:

TCL VOCs	=	Target Compound List volatile organic compounds
TCL SVOCs	=	Target Compound List semivolatile organic compounds
TCL PEST/PCBs	=	Target Compound List pesticide/polychlorinated biphenyls
Total TAL Metals	=	Total Target Analyte List metals
Dissolved TAL Metals	=	Dissolved Target Analyte List metals
X	=	Analysis performed
NAPL	=	Nonaqueous phase liquid
TCLP	=	Toxicity Characteristic Leaching Procedure
Blank Space	=	Analysis not performed

TABLE 2-10

TECHNICAL MEMORANDA SUMMARY
LENZ OIL SITE
LEMONT, ILLINOIS

Tech Memo No. Date	Section	Comment
Memo No. 1 May 2, 1991	Introduction	Summarizes the scope of the objectives and activities of Phase I, Task 2.
	Physical Characteristics of the Site	Discusses site location and description, physiography, land use, site access, surface water, hydrology, geology, and hydrogeology.
	Site Background	Describes history of ownership; waste storage, transport, and disposal; response actions; and aerial photograph analysis.
	Nature and Extent of Contamination	Describes a preliminary conceptual model for the site, including contamination sources, release mechanisms, migration pathways and potential receptors.
	Conclusions and Recommendations	Describes the significant conclusions from the Phase I, Task 1 activities, and proposes recommended changes in the Phase I, Task 2 Scope of Work.
	Appendix A	Geologic logs.
	Appendix B	Well construction diagrams.
Memo No. 2 May 2, 1992	Introduction	Summarizes the purpose of the soil gas investigation and the technical memorandum.
	Soil Gas Investigation Methodology	Describes the soil gas sampling locations and procedures.
	Analytical Results	Presents the analytical results from the soil gas investigation.
	Conclusions	Presents the conclusions of the soil gas investigation.
	Modifications to Monitoring Well Locations	Proposes modified well locations based on the results of the soil gas investigation.
	Appendix A	Soil gas data validation report.
	Appendix B	Laboratory analytical results and quality control documentation.

FIGURES

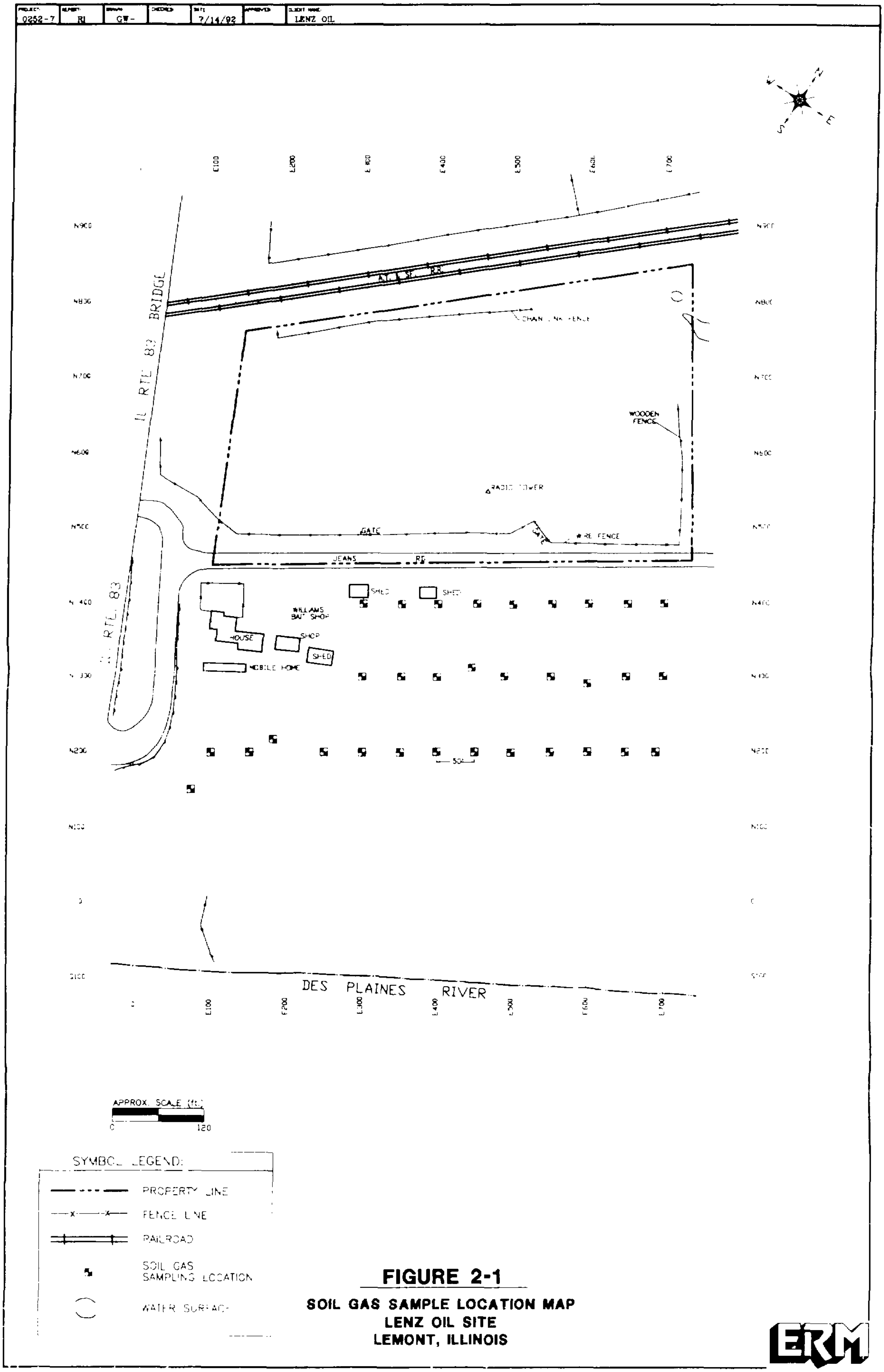
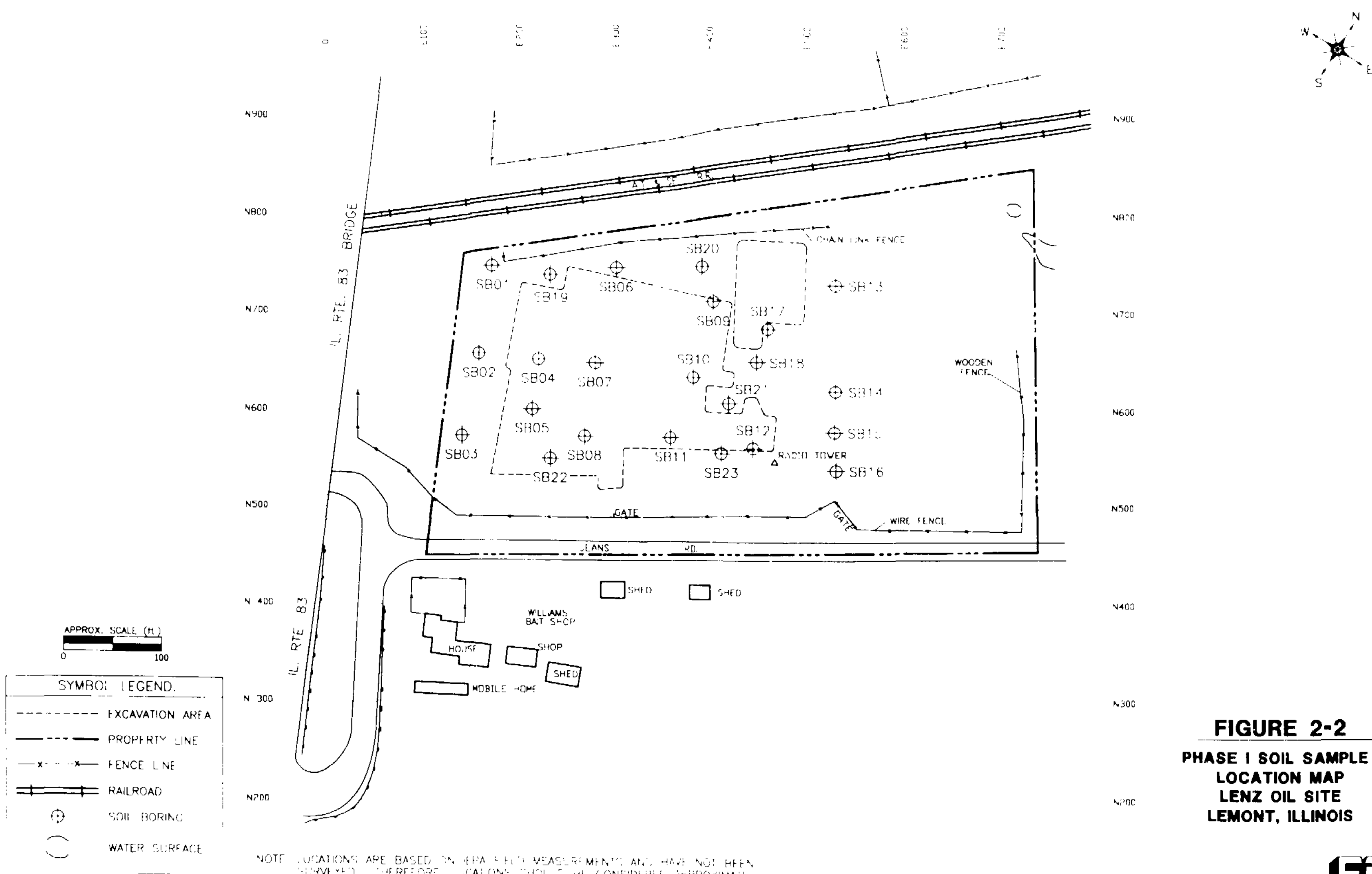


FIGURE 2-1

SOIL GAS SAMPLE LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS



NOTE: LOCATIONS ARE BASED ON IEPA FIELD MEASUREMENTS AND HAVE NOT BEEN SURVEYED. THEREFORE, LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

FIGURE 2-2

PHASE I SOIL SAMPLE LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

PROJECT	REPORT	DRAWN	CHECKED	DATE	APPROVED	CLIENT NAME
0262.7	RI	CV		7/15/92		LENZ OIL

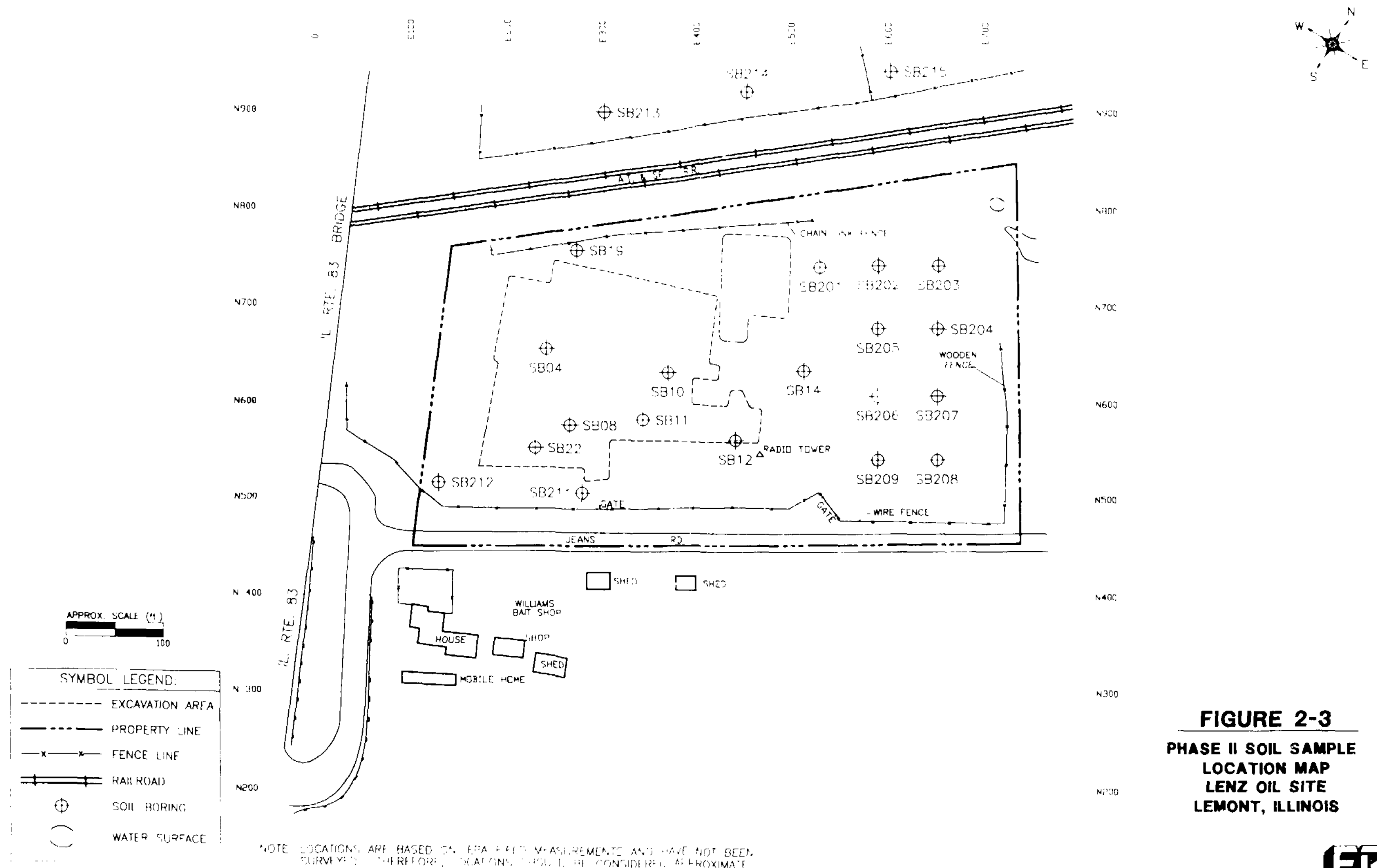
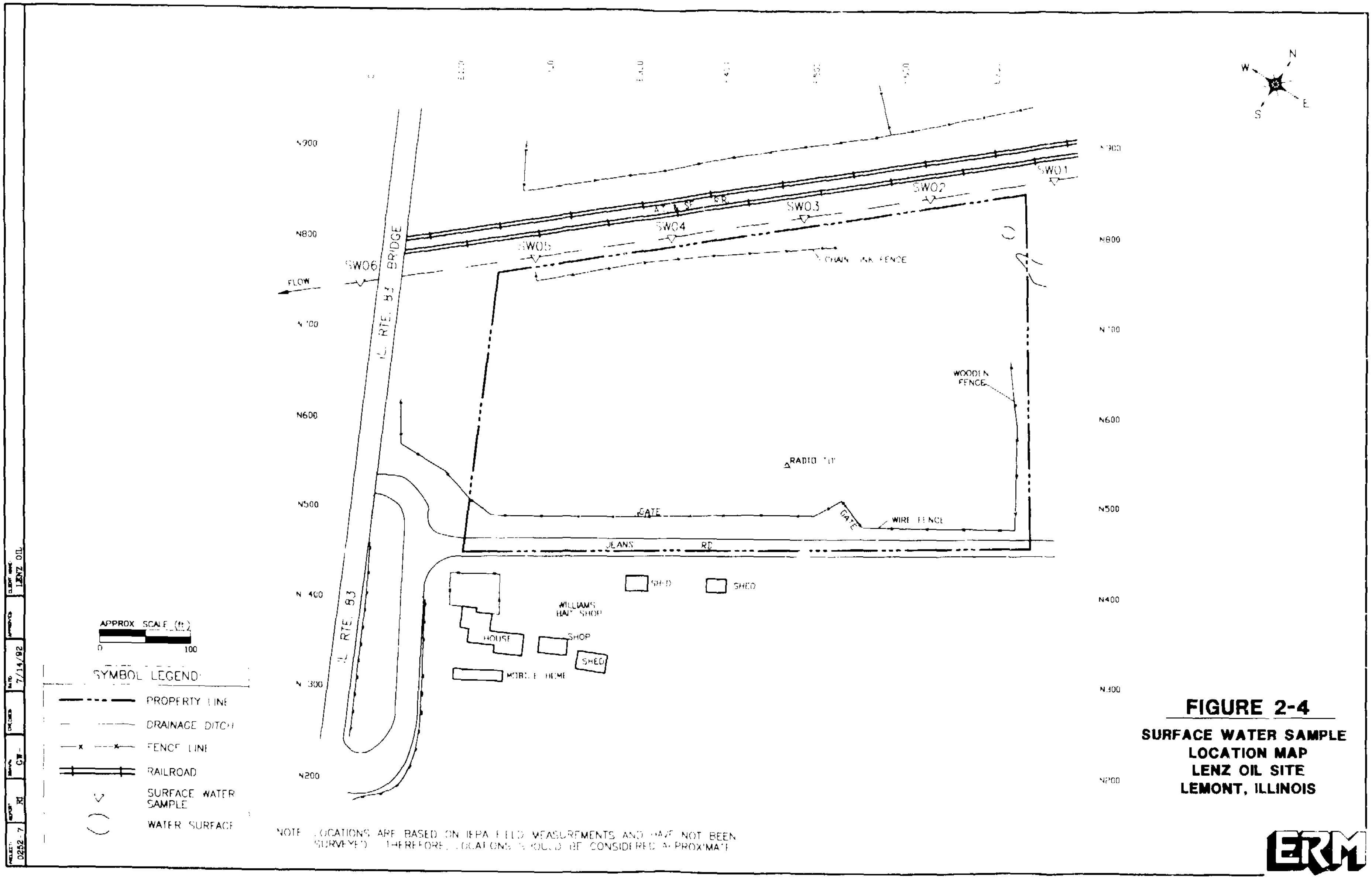


FIGURE 2-3

PHASE II SOIL SAMPLE LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

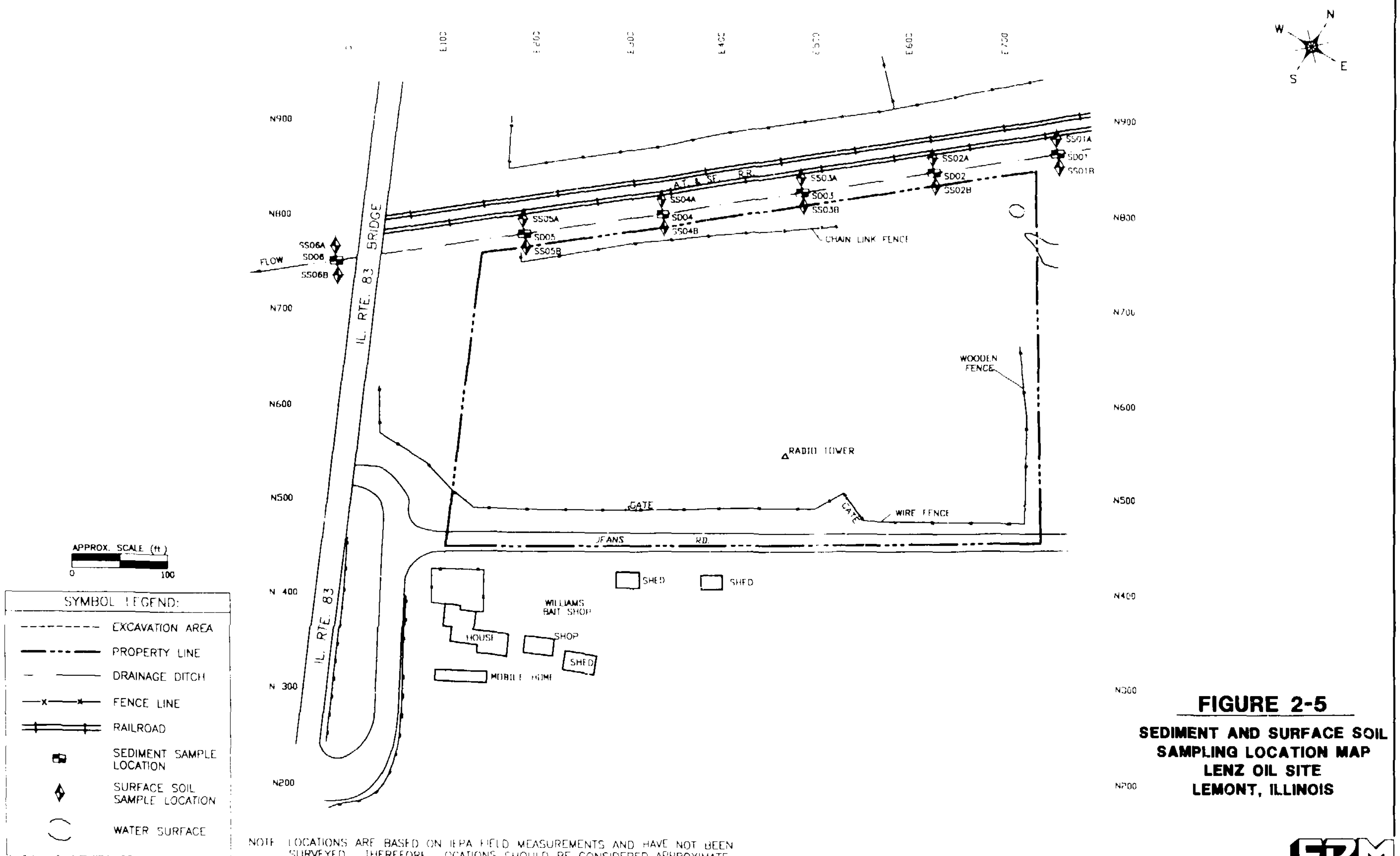


NOTE: LOCATIONS ARE BASED ON IEPA FIELD MEASUREMENTS AND HAVE NOT BEEN SURVEYED. THEREFORE, LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

FIGURE 2-4

SURFACE WATER SAMPLE LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM



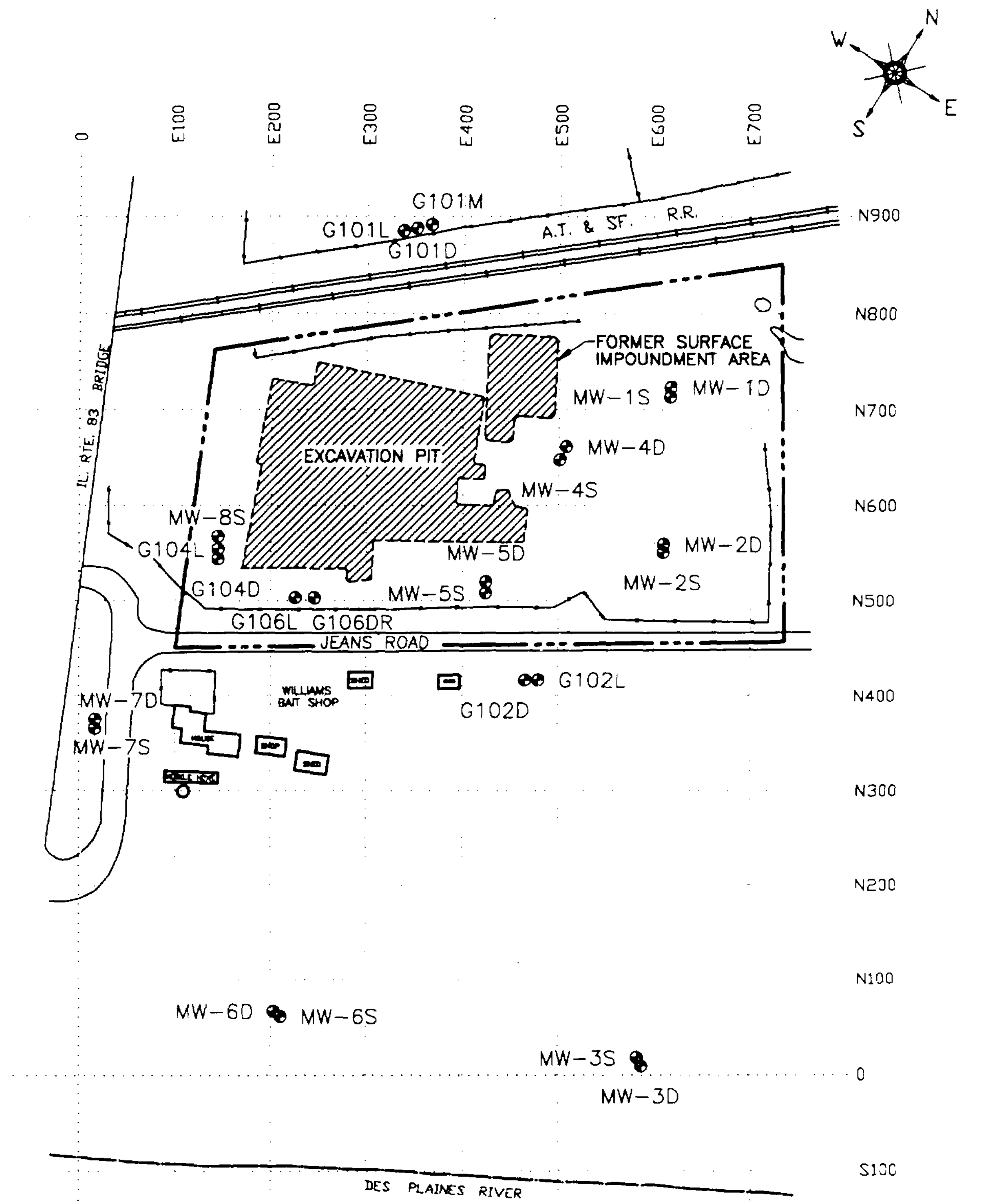
NOTE: LOCATIONS ARE BASED ON IEPA FIELD MEASUREMENTS AND HAVE NOT BEEN SURVEYED. THEREFORE, LOCATIONS SHOULD BE CONSIDERED APPROXIMATE

FIGURE 2-5

SEDIMENT AND SURFACE SOIL SAMPLING LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME	LENZ OIL
APPROVED	
DATE	10/17/92
CHECKED	
DRAWN	GT
REPORT	RI
PROJECT	0252-7



APPROX. SCALE (ft.)

0 160

SYMBOL LEGEND:

- PROPERTY LINE
- FENCE LINE
- RAILROAD
- MONITORING WELL
- BUILDING

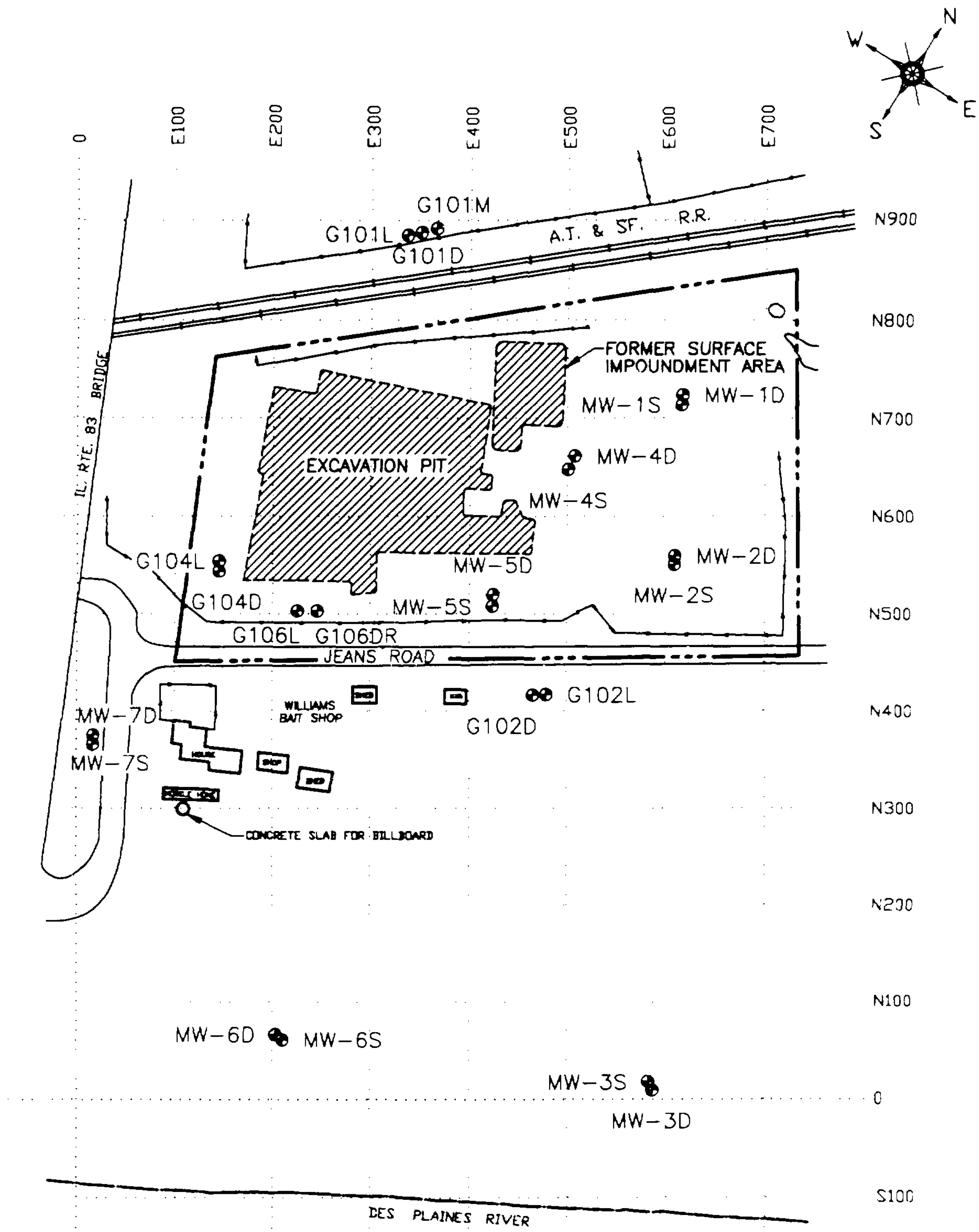
NOTE:
THE LOCATIONS AND DIMENSIONS OF THE MAIN EXCAVATION AND THE FORMER SURFACE IMPOUNDMENT AREAS SHOULD BE CONSIDERED APPROXIMATE.

FIGURE 2-6

MONITORING WELL LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME: LENZ OIL | APPROVED: | DATE: 7/14/92 | CHECKED: | DRAWN: MO- | REPORT: RI | PROJECT: 0252-7



NOTE:
THE LOCATIONS AND DIMENSIONS OF THE MAIN EXCAVATION AND THE FORMER SURFACE IMPOUNDMENT AREAS SHOULD BE CONSIDERED APPROXIMATE.

APPROX. SCALE (ft.)
0 160

SYMBOL LEGEND:

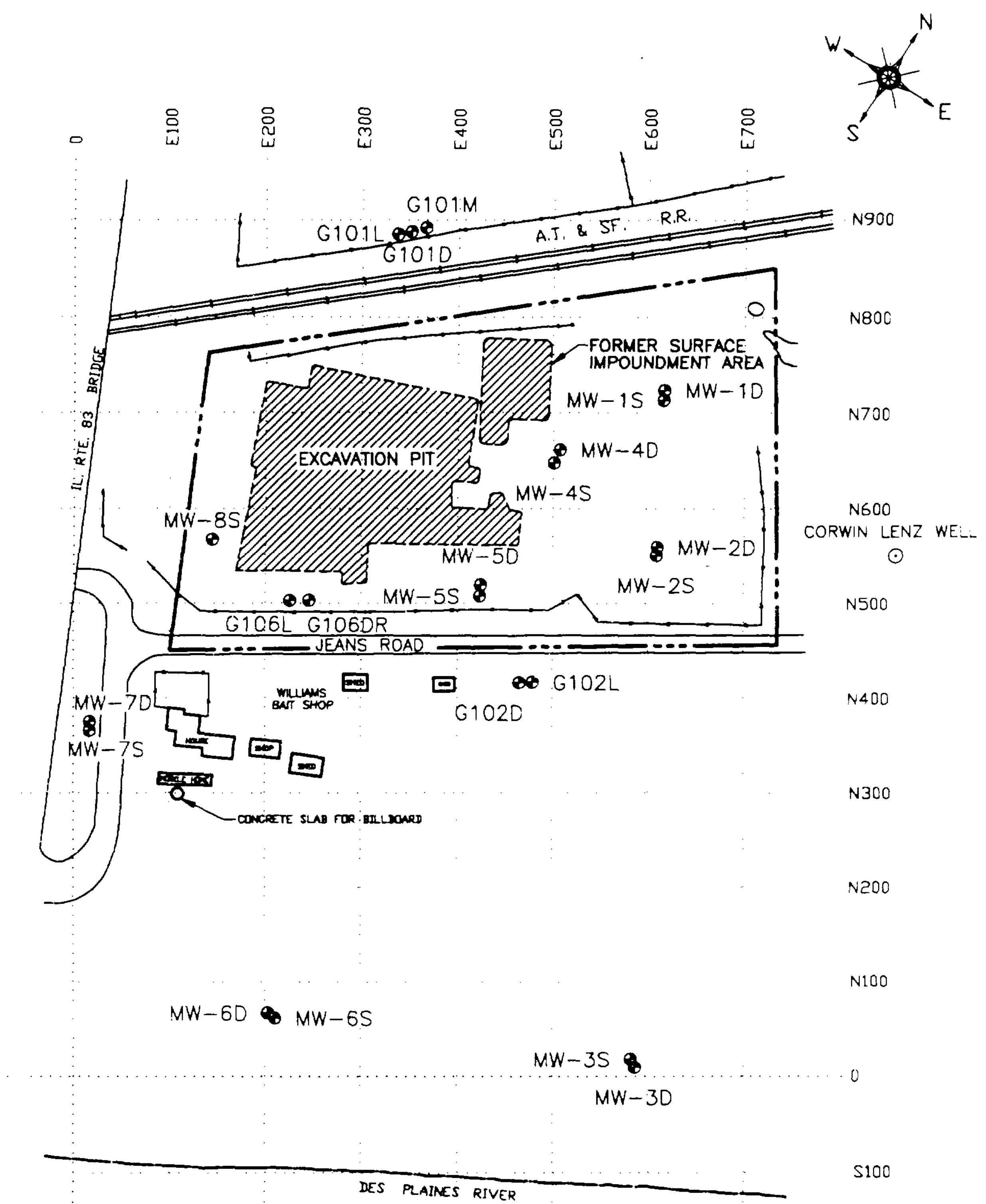
- PROPERTY LINE
- FENCE LINE
- RAILROAD
- MONITORING WELL
- BUILDING

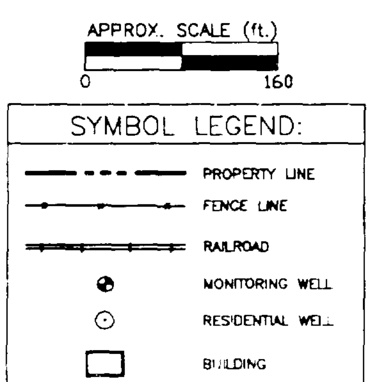
FIGURE 2-7

ROUND ONE GROUND WATER SAMPLE LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME: LENZ OIL
APPROVED:
DATE: 7/14/92
CHECKED:
DRAWN: MO-
REPORT: RI
PROJECT: 0252-7





NOTE:
THE LOCATIONS AND DIMENSIONS OF THE MAIN EXCAVATION AND THE FORMER SURFACE IMPOUNDMENT AREAS SHOULD BE CONSIDERED APPROXIMATE.

FIGURE 2-8

ROUND TWO GROUND WATER SAMPLE LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME: LENZ OIL
APPROVED:
DATE: 7/14/92
CHECKED:
DRAWN: MO-
REPORT: RI
PROJECT: 0252-7

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

The information concerning the physical characteristics of the area around and including the Lenz Oil site is described in this section. The sources of this information include published reports; discussions with various Federal, State, and local agencies; and field investigation activities conducted during the RI. The physical characteristics assessed to evaluate the current conditions of the site area and to assist in determining the feasibility of potential remedial alternatives for the site include:

- Surface features,
- Meteorology,
- Surface water hydrology,
- Geology,
- Soils,
- Hydrogeology,
- Population and potential receptors, and
- Ecology.

Detailed descriptions of these physical characteristics, as they relate to the Lenz Oil site RI/FS, are presented in the following subsections.

3.1 Surface Features

This subsection contains a description of the regional and site-specific physiography, land use, and surface features pertinent to the Lenz Oil site RI/FS.

3.1.1 Physiographical Surface Features

The Lenz Oil site is located in the Wheaton Morainal Country Subsection of the Great Lakes Section of the Central Lowland Physiographic Provence (Willman, 1971). In general, the Wheaton Morainal Country is characterized by physiographic features sculpted by continental glaciers. It contains rough knob and kettle topography, kames, kame terraces, and eskers, all of which are among the youngest Wisconsinan drift deposits. This widespread mantle of glacial drift was deposited over an irregular bedrock erosional surface. The thickness of the drift varies, depending on the nature of the bedrock topography, the glacial history, and the amount of post-glacial erosion.

The physiography of the area immediately surrounding the Lenz Oil site is one of undulating uplands, which have been dissected by well-developed drainage channels and rivers. The uplands are characteristic of the rough-surfaced moraines of the Valparaiso Morainic System, portions of which contain pothole lakes and wetland areas. Erosion along the Des Plaines River has removed the glacial deposits along the river pathway, thereby exposing the underlying bedrock in a number of areas.

The Lenz Oil site is located in the floodplain of the Des Plaines River, where the river cuts through the rough knob and kettle topography of the Valparaiso Morainic System. As shown on Figure 1-1, the site is situated at the base of a 75-foot bluff that defines the northern boundary of the Des Plaines River Valley. The river valley is relatively smooth and flat compared to the adjacent moraine deposits. The Des Plaines River is approximately 600 feet southeast of the site, and the Chicago Sanitary and Ship Canal is an additional 800 feet beyond the Des Plaines River. On the north side of the Des Plaines River, the regional slope is toward the southeast (i.e., toward the river); however, the site topography has been modified, and the site now slopes toward the west and northwest, where a small intermittent drainage ditch is situated. The elevation of the site is approximately 600 feet AMSL.

3.1.2 Land Use

The Lenz Oil site and most of the surrounding area are either idle and undeveloped or used for commercial, light industrial, or residential purposes (Figure 3-1). The site itself is currently vacant and idle. The Atchison, Topeka, and Sante Fe Railroad operates a railroad line located immediately northwest of the site. The land to the northwest of the railroad primarily consists of a wooded area with a few isolated residential and commercial properties. The areas immediately northeast and southeast of the Lenz Oil site are used for residential purposes; however, large portions of the land are undeveloped and idle. Further east of the site, the land is utilized for commercial and light industrial purposes (i.e., for auto wrecking, fire wood cutting, and paving). The property southwest of the site is also used for commercial purposes (i.e., for a large auto wrecking facility). The land to the south of the Lenz Oil site, between the Des Plaines River and the Chicago Sanitary and Ship Canal consists of wetlands and idle woodland.

Several notable land use features are located outside the immediate vicinity of the Lenz Oil site. The Argonne National Laboratory reservation is located approximately 1,400 feet northwest of the site, and the southern border of the community of Downers Grove is situated approximately 3,500 feet north of the site. Much of the area to the southeast of the site, across the Des Plaines River and the Chicago Sanitary and Ship Canal, consists of forest preserve and wetlands. Finally, several large industrial complexes are situated along the Des Plaines River, both upstream and downstream of the Lenz Oil site.

3.1.3 Site Access

Access to the Lenz Oil site is controlled by a combination of wire, chain-link, and wooden fencing. As shown on Figure 1-2, the fencing is continuous along the southeastern half of the site, but gaps in the fencing occur in the northern and western corners. Two gates in the fencing along Jeans Road, which are secured with chains and lock, serve as the primary entry points to the site. No on-site personnel control access to the property.

3.2 Meteorology

According to the annual summaries of the meteorological data recorded at the O'Hare weather station, the Chicagoland area is "a region of frequently changeable weather. The climate is predominately continental, ranging from relatively warm in the summer to relatively cold in the winter. However, the continentality is partially modified by Lake Michigan, and to a lesser extent by the other Great Lakes." Temperatures of 96° F or higher occur in about half of the summers, while about half of the winters have a minimum low temperature of -15° F. Most of the precipitation that falls in Chicagoland is derived from air that has passed over the Gulf of Mexico. In winter, lake-effect snow occurs a few times per year, and summer thunderstorms are often locally heavy and variable. Longer periods of continuous precipitation occur during the spring, winter, and autumn. The amount of sunshine is moderate in the summer and quite low in the winter. The average annual temperature at O'Hare is 47° F, and the annual precipitation is 35.4 inches. The monthly climatological data summaries obtained for the duration of the RI field activities (i.e., January 1991 through March 1992) are included as Appendix L.

3.3 Surface Water Hydrology

The Lenz Oil site is located within the Des Plaines River subbasin of the Mississippi River watershed. It is situated within the Des Plaines River Valley, which contains the Chicago Sanitary and Ship Canal, the Illinois and Michigan Canal, and the Des Plaines River/Diversion Channel (Figure 1-1). The Des Plaines River and the Chicago Sanitary and Ship Canal merge into a single river approximately three miles north of Joliet. The Calumet Sag Channel, which is an extension of the Little Calumet River, discharges to the Chicago Sanitary and Ship Canal approximately 3/4 miles southwest of the Lenz Oil site (Figure 1-1). All of the surface water in the Des Plaines River Valley flows to the southwest and eventually empties into the Mississippi River. The Des Plaines River is approximately 200 feet wide at its closest approach to the Lenz Oil site; however, the adjacent Chicago Sanitary and Ship Canal is approximately 150 feet wide at the same location. According to the ISWS, the discharge of the Des Plaines River in the vicinity of the site (i.e., the Riverside gage) ranged from 147 cubic feet per second (cfs) to 3,720 cfs in 1989. The maximum flow recorded in the Des Plaines River since the installation of the Riverside gage in 1943 is 9,770 cfs. Based on measurements taken at the Romeoville gage, discharges into the Chicago Sanitary and Ship Canal ranged from 1,790 cfs to 12,800 cfs in 1989. The maximum flow recorded in the Chicago Sanitary and Ship Canal since 1974 is 16,300 cfs.

There are no permanent storm sewers or drainage systems to direct surface water runoff from the site. As a result, the surface water runoff from the Lenz Oil site either infiltrates the on-site soil or flows to the west and northwest where it discharges to the drainage ditch that is situated along the northwestern border of the site. The surface water in this drainage ditch intermittently flows to the west and appears to pond on an auto wrecking facility west of Illinois Route 83. ERM-North Central determined that the flow in the ditch is intermittent by conducting frequent inspections of the drainage ditch during the RI. During dry weather, the ditch is generally dry and contains only a few areas of ponded water in the ditch bed. However, during wet weather or after snow melts, the ditch generally contains running water, and under high flow conditions, the water in the drainage ditch eventually discharges to the Des Plaines River.

3.4 Geology

The following two subsections discuss the regional and site-specific stratigraphy and structural geology pertinent to the Lenz Oil site.

3.4.1 Regional Geology

All of northern Illinois, including the Lenz Oil site, is located within the Central Stable Region tectonic province of the North American continent. The region is characterized by a sequence of southward-thickening sedimentary strata overlying Precambrian basement rocks, which were subject to a series of vertical crustal movements that formed broad basins and arches during the Paleozoic and early Mesozoic time periods. The arches and basins subsequently have been modified by local folding and faulting activity. The major geologic structures of the region include:

- Illinois Basin - an oval-shaped basin with a depocenter located south of the Lenz Oil site in South-Central Illinois. Strata in the basin rises gently toward the Kankakee Arch, which is located in northeastern Illinois.

- Kankakee Arch - a northwest-southeast trending extension of the Wisconsinan Arch. The Arch is a result of crustal uplift.

- Sandwich Fault Zone - a northwest-southeast trending vertical fault, approximately 85 miles in length. The fault has about 900 feet of vertical displacement, and all movement along the fault is post-Silurian and pre-Pleistocene.

The Lenz Oil site is located on the crest of the Kankakee Arch, near the northeastern edge of the Illinois Basin. The southeastern extent of the Sandwich Fault Zone is approximately 23 miles southwest of the Lenz Oil site at its closest approach. Although all of these structural features are presently inactive, past activity has strongly influenced the local character of bedrock. For example, tensile stress from the subsidence of the Michigan and Illinois basins and the uplift of the Wisconsinan and Kankakee arches have caused fracturing in the shallow bedrock (Foote, 1982). However, the site is situated on the crest of the Kankakee Arch, where the bedrock is essentially horizontal (Foote, 1980).

The geology of southeastern DuPage County consists of a thick sequence of Silurian bedrock overlain by Quaternary glacial drift and alluvial deposits. A generalized stratigraphic column for the Chicago area is shown on Figure 3-2. The uppermost bedrock in the study area is Silurian dolomite of the Niagaran and Alexandrian Series (Willman, 1971). The Kankakee and Elwood Formations, which are part of the

Alexandrian Series, are overlain by the Joliet, Sugar Run, and Racine Formations of the Niagaran Series (Willman, 1971). The lithology of all of these formations is generally a light gray, pure to silty, sometimes cherty, well-bedded, fractured dolomite. The thickness of the Silurian dolomite varies across southeastern DuPage County because of differential pre-glacial and post-glacial erosion of the bedrock surface. The USGS drilled a test boring in the Palos Forest Preserve, which is located across the Des Plaines River Valley to the southeast of the Lenz Oil site. During the advancement of this boring, approximately 171 feet of Silurian dolomite were encountered before penetrating the underlying bedrock unit (Nicholas and Healy, 1988).

The bedrock surface in southeastern DuPage County is an irregular erosional surface, most of which was shaped by Pleistocene glaciation (Willman et al., 1975). Data from outcrops and borings show that the bedrock has a gently rolling, dissected surface with a well-integrated drainage pattern. A number of deep (i.e., up to 150 feet) paleo-river valleys were cut into the underlying bedrock during a major deglaciation event in the area. Seismic-refraction data collected by Nicholas and Healy (1988) and outcrop and boring data suggest that the bedrock surface is a former karst plain with a weathered zone up to 5 feet thick at the top.

Studies by Zeizel and others (1962), Foote (1982), Nicholas and Healy (1988), and ERM-North Central (Appendix E) have shown that the Silurian dolomite in the vicinity of the Lenz Oil site contains four sets of fractures, three of which are vertical and one of which is horizontal. The vertical fracture sets include: (1) a primary set with an average azimuth of 130 to 135 degrees, (2) a secondary set oriented at right angles to the primary set, with an average azimuth of 40 to 45 degrees, and (3) a minor tertiary set with an average azimuth of 20 degrees. In general, the vertical fracture sets, which were caused by structural deformation, decrease in frequency and width (or aperture) with depth.

In outcrop, the aperture of the primary and secondary fractures varies from approximately 4 inches to tightly closed, and the exposed fractures are generally wider than the unexposed fractures because of weathering. The spacing of the fractures ranges from 0.5 to 36 inches and averages approximately 12 inches for the primary sets, and from 8 to 24 inches and averages approximately 14 inches for the secondary sets. Where present, the tertiary fractures are prominent and laterally extensive. The length and depth of the fractures could not be accurately discerned because of limited bedrock exposure.

Horizontal fractures, formed from carbonate dissolution along bedding planes, are evident in outcrops, cores, and from interpretation of borehole geophysical logs. Outcrops along the northern side of the Des Plaines River Valley display prominent horizontal fractures (bedding planes) hundreds of feet long. Many of the bedding planes joints are weathered, and some are several inches wide. The correlation of the horizonal bedding planes between borings is excellent, which suggests that they are continuous in the subsurface. The apertures of subsurface bedding planes, many of which are infilled with sediment, are as wide as 2 feet. Regional horizontal bedding planes have been documented at elevations of approximately 415, 440, 525, 550, and 565 feet AMSL by Nicholas and Healy (1988).

Unconsolidated deposits of Quaternary age overlie the Silurian bedrock throughout southeastern DuPage County, except where it has been removed by man or erosion and the underlying bedrock is exposed (Willman, 1971). Most of the unconsolidated deposits consist of Pleistocene glacial drift, which is generally of Wisconsinan age. This glacial drift is primarily comprised of the Wadsworth Till Member of the Wedron Formation, which is a silty and pebbly clay till with local beds of sandy to gravelly moraine deposits (Willman and Lineback, 1970). The Wadsworth Till Member is widespread in upland areas, but has been removed by erosion from the Des Plaines River Valley. A thin veneer of Wisconsinan and Holocene alluvium (i.e., the Mackinaw Member of the Henry Formation and the Cahokia Alluvium) composed of well-sorted to poorly sorted deposits of silts, sands, and local sandy gravels is present along portions of the Des Plaines River Valley.

3.4.2 Site Geology

Based on detailed descriptions of the bedrock, soil, and fill materials encountered at the site during the RI, the following facies have been defined to describe the stratigraphy of the site:

- Racine dolomite,
- Silty gravel,
- Silty clay,
- Silty-sand backfill, and
- Excavation backfill.

The vertical and lateral stratigraphic relationships of these geologic facies are displayed on three cross sections of the site (Figures 3-3 through 3-5).

Racine-Dolomite Facies

The entire site is underlain by the Silurian Racine Dolomite Formation. In general, this facies consist of yellowish gray, finely crystalline, fractured dolomite with some intraclasts and peloids. It occasionally contains wavy laminae, thin sand beds, and fossiliferous zones. The dolomite facies is generally below the water table.

A close evaluation of the bedrock cores collected during the installation of the monitoring wells reveals the presence of several discrete fracture zones in the dolomite facies. Most of the fractures are horizontal and appear to be bedding planes, but high-angle fractures are also present. Infillings of clay, calcite, and/or heavy minerals occur in many of the fractures. Major fracture zones that can be correlated between cores and appear to be continuous in the subsurface are present at elevations of 587, 577, 574, 570, 563, 559, 555, and 553 feet AMSL. The thickness of these fracture zones ranges from 0.3 to 2.8 feet, and the ratio of horizontal to high-angle fractures varies significantly across the site and with depth. These fracture zones probably correlate with some of the regional horizontal fractures (or bedding planes) identified by Nicholas and Healy (1988).

The surface of the dolomite facies is irregular, varying as much as 16 feet in elevation over the site. In general, the dolomite is shallower on the western half of the site than on the eastern half (see Figure 3-4). The bedrock is shallowest to the southeast of the site near the Des Plaines River, where it is only 2 to 3 feet below ground surface; however, bedrock was encountered down to 26.5 feet below ground surface at the site (see Figure 3-3).

Silty-Gravel Facies

The silty-gravel facies is characterized by medium-light-gray silty dolomite gravel with varying amounts of sand and clay. The facies contains large dolomite boulders, cobbles, and pebbles that are very angular. It is always underlain by Silurian dolomite and is generally overlain by the silty-clay facies. The thickness of the facies varies from 1 foot to approximately 18 feet in the vicinity of the site. In most portions of the site, the silty-gravel facies is below the water table. The facies is interpreted to be a layer of weathered dolomite.

Silty-Clay Facies

The silty-clay facies is generally a mottled light gray and moderate olive-brown color that is occasionally stained black near the main excavation area. The facies consists of silt and silty clay with a trace of well-rounded to subangular dolomite pebbles. The upper few feet of the facies have been reworked in several areas of the site and commonly contain traces of wood, incinerator ash, sand, and oil.

The silty-clay facies mantles the surface of the Lenz Oil site and ranges from 3 to 13 feet in thickness. The lower portion of the facies is below the water table in many areas of the site. Based on its stratigraphic position and its lithologic character, the silty-clay facies is probably either alluvial deposits from the Des Plaines River or part of the Mackinaw Member of the Henry Formation. In most portions of the site, it overlies the silty-gravel facies.

Silty-Sand Backfill Facies

The silty-sand backfill facies is composed of moderate yellowish brown to grayish yellow silty sand and gravelly clay backfill. Because this facies forms the road base for Route 83, the facies has been extensively compacted and consequently is very hard and only slightly permeable. The facies is limited in extent to the area adjacent to Route 83 and forms a discontinuous confining layer over the surficial aquifer. Dolomite bedrock underlies the facies, and the silty-clay facies and the silty-gravel facies are laterally adjacent to it. The facies is 24 feet thick at MW-7, the only location where it was encountered.

Excavation Backfill Facies

This facies consists of the backfill placed in the main excavation area on the Lenz Oil site. Based on the IEPA's descriptions of this material, the facies is characterized by dark brown to black sand, gravel, and incinerator ash. The facies is approximately 12 feet thick and is underlain by a visqueen liner. The lower portion of the facies is below the water table. According to the IEPA, the excavation backfill facies overlies Silurian dolomite and laterally juxtaposes the silty-clay facies and/or the silty-gravel facies.

3.5 Soils

The surficial soil types in the vicinity of the Lenz Oil site, as described in the Soil Survey of DuPage and Part of Cook Counties, Illinois (Maps, 1979), include: the Kane, Sawmill, Kankakee, and Morley series. The distribution of these soil types is shown on Figure 3-6.

Most of the Lenz Oil site and the area directly northeast and southwest of the site is covered with soil of the Kane series (Figure 3-6). These soils are somewhat poorly drained and form in 20 to 40 inches of loamy material overlying stratified gravel and sand. The Kane series soils are moderately permeable in the upper part, rapidly permeable in the lower part, and form 0 to 3 percent slopes.

The northeastern portion of the Lenz Oil site along the drainage ditch and the area along the Des Plaines River are characterized by surface soils of the Sawmill series (Figure 3-6). These soils form in silty alluvial material and consist of deep, poorly drained, moderately permeable, medium silty-clay loam with some strata of light silty-clay loam to silty clay. The Sawmill series soils form on floodplains and form slopes of 0 to 2 percent.

The northwestern portion of the Lenz Oil site, along the drainage ditch, is covered with soil of the Kankakee series (Figure 3-6). This series consists of well- or moderately well-drained, moderately rapidly permeable soils on high benches along drainageways. The Kankakee series soils form in outwash that is loamy in the upper part and cobbly loam and sandy loam in the lower part. Slopes formed by this soil range from 2 to 7 percent.

The area to the north of the Lenz Oil site is characterized by soils of the Morley series, which consists of deep, well-drained, moderately slowly permeable and slowly permeable soils on uplands. These soils form slopes of 2 to 35 percent, and form in silty-clay loam glacial till.

3.6 Hydrogeology

The regional and site-specific ground water hydrology pertinent to the Lenz Oil site RI/FS are presented in the following subsections.

3.6.1 Regional Hydrogeology

The aquifers pertinent to the Lenz Oil site RI/FS are the shallow glacial drift and the Silurian dolomite aquifers. The glacial drift aquifers consist of relatively clean, coarse-textured deposits of sand and gravel that occur erratically throughout the glacial drift. Three categories of glacial drift aquifers are recognized in DuPage County: (1) surficial, (2) interbedded, and (3) basal. Surficial glacial drift aquifers appear just below the land surface and consist of sand and gravel deposits of glacial outwash origin. These deposits are generally concentrated in the valleys of the major drainageways in the area. Because these deposits are not laterally extensive, few producing wells are completed in surficial glacial drift aquifers.

Interbedded glacial drift aquifers are deposits of sand and gravel, which occur as lenticular or sheet-like deposits, erratically distributed throughout the glacial drift. The sand and gravel beds are generally interbedded with fine-grained glacial till. Although numerous, these interbedded sand and gravel deposits are generally too thin and/or too discontinuous to yield producible volumes of water. The basal glacial drift aquifers consist of sand and gravel deposits at the base of the glacial drift, directly above the Silurian dolomite. These deposits are also extremely variable in terms of thickness and lateral continuity. Although the basal drift aquifers have relatively high permeabilities and produce sufficient volumes of water, they are generally bypassed in favor of completing the well in the underlying dolomite. Although glacial drift aquifers exceeding 40 feet in thickness are present within a two-mile radius of the Lenz Oil site, a review of private well logs in that area has demonstrated that few private drinking water wells are completed in the glacial drift aquifers.

The Silurian dolomite aquifer includes rocks of the Niagaran and Alexandrian series. The depth to the top of the Silurian dolomite aquifer (and consequently the thickness of the Silurian dolomite aquifer) varies widely over short distances because of the irregular nature of the bedrock surface. According to an aquifer thickness map by Zeizel and others (1962), the thickness of the Silurian dolomite aquifer is between 150 and 200 feet thick below the Lenz Oil site.

Most of the porosity and permeability in the Silurian dolomite aquifer is in the form of macroporosity and has a secondary origin (i.e., it was formed after the deposition and consolidation of the rock). The most numerous types of secondary openings are joints and fractures that were produced in the dolomite by deformation forces and later enlarged by dissolution (Zeizel et al., 1962). According to Nicholas and Healy (1988), most ground water flow in the dolomite occurs in large joints, especially horizontal joints. However, the total void space represented by these fractures is relatively small compared with the total volume of the rock unit.

Both Nicholas and Healy (1988) and Zeizel and others (1962) report that the weathered zone at the top of the Silurian dolomite and the uppermost horizontal joints within the dolomite are the major conduits for ground water flow in the aquifer. Surface and subsurface investigations of the dolomite show that, in general, enlargement of joints by solution activity has been greatest in the upper portion of the bedrock. Consequently, most wells in the vicinity of the Lenz Oil site are completed in the upper 60 feet of the Silurian dolomite aquifer. Below this depth, the unit has much less secondary porosity and a significantly reduced transmissivity. According to Zeizel and others (1962), the Silurian dolomite aquifer has an extensive network of interconnected joints, fractures, and solution cavities. The basis for this conclusion is: (1) the reliability of the dolomite as a source of ground water, (2) the high yields of wells drilled into the dolomite, and (3) the relatively uniform piezometric surface of shallow ground water in the dolomite. Nicholas and Healy (1988) determined that horizontal joints below an elevation of approximately 570 feet form a regional ground water flow system that extends throughout the Palos Forest Preserve, which is located across the Des Plaines River Valley from the site. It is likely that the same set of horizontal joints extends below the Des Plaines River Valley and underlies the Lenz Oil site.

Vertical joints in the Silurian dolomite aquifer result in an areal anisotropic transmissivity in the aquifer. This conclusion was drawn by Nicholas and Healy (1988) after interpreting aquifer test data from a ground water study at the Argonne National Laboratory site by using the Papadopulos (1965) solution for anisotropic transmissivity. However, Nicholas and Healy (1988) further concluded that, because the location of individual vertical joints and joint sets was not known for their study area, the effect of vertical joints on ground water flow could not be assessed.

The shallow glacial deposits and the Silurian dolomite are commonly hydraulically interconnected and together form the surficial aquifer in the vicinity of the Lenz Oil site. Ground water in this aquifer generally is unconfined, and flow is controlled principally by topography. Topographic highs are usually areas of ground water recharge; and conversely, topographic lows are usually areas of ground water discharge. Water level data collected by Nicholas and Healy (1988) from the Palos Forest Preserve clearly demonstrate that ground water flows from the upland areas toward the Des Plaines River Valley. Static water level data from geologic logs of private wells within a two-mile radius of the Lenz Oil site further support the conclusion that ground water in the surficial aquifer flows from upland areas, where the aquifer is recharged, toward the Des Plaines River Valley and the Calumet Sag Channel Valley, where the aquifer discharges. Because the Des Plaines River Valley and the Calumet Sag Channel Valley are major discharge points for the surficial aquifer, the aquifer can be divided into three areas that are hydraulically isolated from each other, including:

- The area north of the Des Plaines River Valley,
- The area south of the Des Plaines River Valley and east of the Calumet Sag Channel Valley, and
- The area south of the Des Plaines River Valley and west of the Calumet Sag Channel Valley.

The Lenz Oil site is situated in the area north of the Des Plaines River Valley and, therefore, the surficial aquifer below the site is hydraulically isolated from the surficial aquifer on the south side of the Des Plaines River Valley.

3.6.2 Site Hydrogeology

Stratigraphic and water level data collected during the RI show that the surficial aquifer at the site is composed of a thin (0- to 26.5-foot) layer of unconsolidated alluvium overlying approximately 150 to 200 feet of Silurian dolomite. Although these two geologic units have different physical characteristics (i.e., hydraulic conductivities, horizontal and vertical flow gradients, and transmissivities), they are hydraulically interconnected via the intervening zone of weathered dolomite and act as a single unconfined aquifer at the site.

The unconsolidated portion of the surficial aquifer is composed of the silty-clay facies, silty-gravel facies, and excavation backfill facies. In general, the silty-gravel facies is saturated, and the silty-clay and excavation backfill facies are partially saturated. The saturated thickness of the unconsolidated deposits is approximately 20 feet near MW-5S, but thins to less than 1.0 foot near the Des Plaines River. The excavation backfill facies is largely hydraulically isolated from the rest of the surficial aquifer by a 10 mil (0.001 inch) pond-liner grade visqueen liner, that was installed by the IEPA during the remediation of the soil in the main excavation area. The visqueen was manually installed, and the overlapping sheets of visqueen were solvent welded together. This liner covers the entire excavation area including the floor, sidewalls, and one foot of the level ground surrounding the excavated area. According to the IEPA, the liner was punctured in at least four locations during the Phase I soil investigation. Each puncture was backfilled with bentonite pellets to seal the hole.

The results of the hydraulic conductivity tests performed on the unconsolidated deposits (i.e., primarily the silty-gravel facies, but also some silty-clay deposits) show that the horizontal hydraulic conductivity of these deposits varies from 178 to 4102.5 gal/day/ft^2 (see Appendix I). The high horizontal hydraulic conductivity results support the conclusions of Nicholas and Healy (1988) and Zeizel and others (1962) that substantial ground water flow occurs in the weathered zone above the bedrock. No data regarding the vertical component of hydraulic conductivity was collected; however, the vertical component of hydraulic conductivity in unconsolidated deposits is generally less than the horizontal component of hydraulic conductivity. This is caused by the layered heterogeneity and anisotropy that generally forms in sedimentary deposits during deposition. According to Freeze and Cherry (1979), it is not uncommon for layered heterogeneity to produce horizontal to vertical hydraulic conductivity ratios on the order of 100:1.

The results of the grain size, porosity, and TOC analyses performed on the five unconsolidated aquifer material samples collected from the site are presented in Appendix J. The samples were collected from both the silty-clay facies (i.e., MW01S and MW04SDUP) and the silty-gravel facies (i.e., MW02S, MW04S, and MW05S). In general, the results of the grain size analyses agree with the field descriptions of the sample intervals and support the descriptions of the silty-clay and silty-gravel facies. As shown in Appendix J, the porosity of the unconsolidated samples ranges from 19.1 to 57.0 percent, with a geometric mean of 36.8 percent, and the TOC content of the samples ranges from 1,608 to 15,000 mg/Kg, with an arithmetic mean of 12,121 mg/Kg (i.e., 1.2 percent).

The bedrock portion of the surficial aquifer consists of fractured Silurian dolomite. Boring logs show the presence of several extensively fractured zones in the bedrock (see Appendices E and F). As previously noted, most of these fracture zones are horizontal bedding planes that have been enlarged by solution activity. These horizontal fractures are probably the main conduits for ground water flow. Vertical fractures probably also influence ground water flow, but they are less common and more difficult to trace or correlate in the subsurface.

The results of the slug and pressure tests performed in the deep monitoring wells indicate that the horizontal hydraulic conductivity values for the fractured dolomite range from 12 to 819 gal/day/ft^2 (see Appendix I). These values are reasonably consistent with the horizontal hydraulic conductivity values determined from the pump test data reported by the USGS on the fractured dolomite at the Palos Forest preserve, which is located across the Des Plaines River Valley from the site. The pump test data indicate that the horizontal hydraulic conductivity values for the fractured dolomite aquifer range from 250 to 400 gal/day/ft^2 (Nicholas and Healy, 1988). No site-specific data describing the vertical hydraulic conductivity of the fractured bedrock is currently available. However, the hydraulic conductivity testing of the fractured dolomite at the Palos Forest Preserve shows that the horizontal component of hydraulic conductivity is generally greater than the vertical component of hydraulic conductivity (Nicholas and Healy, 1988). This is probably because the horizontal fractures are generally larger than the vertical fractures.

The surficial aquifer below the site is unconfined in all areas except at monitoring well MW-7. In that area, the silty-sand backfill facies serves as a localized impermeable barrier and the surficial aquifer is confined. Because the lateral extent of the silty-sand backfill facies is limited to the immediate vicinity of Highway 83, the confined portion of the surficial aquifer is small.

The aquifer is recharged primarily by precipitation. According to Cartwright (1992), approximately 10 percent of the annual precipitation that falls on open fields in the Chicagoland area percolates through the soil and recharges the unconfined surficial aquifers. Therefore, of the 35 inches of precipitation that the site receives each year (see Section 3.2), only approximately 3.5 inches will percolate through the soil and reach the surficial aquifer. The remainder of the precipitation is removed from the site via surface runoff, evaporation, and evapotranspiration.

Water level elevation data collected from the monitoring wells and stream gages at the site show that the aquifer exhibits seasonal fluctuations in the water table elevation (Table 3-1). Piezometric surface contour maps for the top of the unconfined aquifer show that shallow ground water in the surficial aquifer flows southeast, toward the Des Plaines River (Figures 3-7 to 3-10). Based on the piezometric surface elevation in wells G101M and MW-3S, the average horizontal hydraulic gradient is approximately 0.0035 ft/ft toward the southeast and ranged from a low of 0.0009 ft/ft in October 30, 1991 to a high of 0.0053 ft/ft on June 24, 1991. It is apparent that the shallow ground water flow direction shifts to the south near the ditch, along the northwestern part of the site. In addition, the horizontal hydraulic gradient steepens slightly near well G102L and near the Des Plaines River discharge zone, most likely because of sharp changes in topography. Throughout the investigation, an anomalously high ground water level was observed in monitoring well G104L. As discussed in Section 2.12.1, ERM-North Central investigated possible hydrogeologic conditions that would explain the anomalous static water levels. Because no hydrogeologic conditions that would account for the anomaly were present in the vicinity of the well, ERM-North Central concluded that the most reasonable explanation for the anomalous water levels is either well damage or poor well construction (i.e., the well screen and/or sand pack of G104L is probably sealed, and the well is being recharged by surface water runoff). Although this explanation has not been confirmed by removing and inspecting G104L, the water level data from the well are nonetheless suspect and, therefore, not suitable for site characterization.

Piezometric surface maps for the deep portion of the surficial aquifer also demonstrate that ground water generally flows southeast toward the Des Plaines River (Figures 3-11 to 3-14). Based upon the piezometric surface elevation in wells G101D and MW-3D, the horizontal gradient in the deeper part of the surficial aquifer averages approximately 0.0029 ft/ft and ranged from a low of 0.0011 ft/ft in October 31, 1991 to a high of 0.0038 ft/ft on May 9, 1991. The horizontal hydraulic gradient in the aquifer is somewhat smoother across the study area in the deeper part of the aquifer than in the shallower part of the aquifer. Ground water in the bedrock has a localized southeastern to eastern flow direction in the northwestern portion of the Lenz Oil site, which may be the result of vertical joint sets oriented in a southeastern direction beneath the site.

Differences in hydraulic head between the shallow and deep monitoring wells generally show a slight downward component of flow with the average downward vertical hydraulic gradient ranging from -0.0777 ft/ft to -0.0081 ft/ft. This difference in hydraulic head indicates good potential for recharge of the fractured dolomite portion of the aquifer. However, localized variations exist in the magnitude and direction of the vertical flow gradient at the site. For example, an upward vertical flow gradient averaging 0.0111 ft/ft is present at monitoring well cluster MW-3. Because of the proximity of this well cluster to the Des Plaines River, the upward flow gradient probably reflects ground water discharge to the river. However, the October 30, 1990 and November 11, 1991 water level data from this well cluster indicate a downward vertical gradient during these months. This downward flow potential may reflect occasional recharge from the Des Plaines River during seasonal climatic changes. Partially confined conditions are present at the MW-7 location because of local infilling of the area with the silty-sand backfill facies. The average upward vertical hydraulic gradient between wells MW-7S and MW-7D is 0.0090 ft/ft.

Ground water velocity in the unconsolidated part of the surficial aquifer varies spatially because of lithological heterogeneities and variations in the hydraulic gradient. Flow rates are most likely highest in the more permeable weathered dolomite at the base of the unconsolidated deposits. The average horizontal ground water velocity in the unconsolidated deposits is approximately 9.9 ft/day. This value was calculated by using the following formula:

$$V_x = \frac{K \, \Delta h}{n_e \, \Delta l}$$

where:

V_x	=	average linear velocity
K	=	horizontal hydraulic conductivity
n_e	=	effective porosity
$\frac{\Delta h}{\Delta l}$	=	average horizontal hydraulic gradient

As shown in Appendix [illegible], the geometric average of the horizontal hydraulic conductivity measurements taken from the unconsolidated deposits is 774 gal/day/ft^2. Based on the geotechnical test results presented in Appendix J, the geometric average of the effective porosity values for the unconsolidated deposits is 36.8 percent. These two averages and an average on-site horizontal hydraulic gradient of 0.0047 ft/ft (measured between G101M and G106L) were used to calculate the average horizontal ground water velocity in the on-site unconsolidated deposits. All of these values are specific to the on-site unconsolidated deposits and cannot be applied to other parts of the unconfined aquifer.

The ground water flow velocity in the fractured dolomite portion of the surficial aquifer also varies spatially as a result of the varying interconnectedness, orientation, and width (or aperture) of the bedding planes and fractures. Ground water flow rates are probably much higher in individual fractures, and the flow in large fractures may be nonlaminar. Although extensive bedding planes and fractures were encountered during rock coring, the interconnected systems of fractures probably cannot be considered an equivalent porous medium. Therefore, ground water flow rates cannot be calculated for the dolomite. Because the unconfined aquifer downgradient of site (i.e., south of Jeans Road) consists almost entirely of fractured bedrock, the average horizontal ground water velocity can not be calculated for that area.

3.6.3 Ground Water/Surface Water Interaction

Based on the elevation of the ground surface and the elevation of the water table, it appears that the bottom of the drainage ditch to the northwest of the site is occasionally below the water table. This indicates that shallow portions of the unconfined aquifer may, on occasion, discharge into the drainage ditch. The surface water elevations in this ditch were measured at two points on May 9, 1991, and these water level measurements indicate that surface water flows slowly to the southwest with a general slope of 5.9×10^{-4} ft/ft along the northwestern border of the Lenz Oil site. The flow of water in the drainage ditch may add a slight southwesterly component to the shallow ground water flow direction near the ditch. Depending on the relative rates of precipitation and infiltration, the drainage ditch may switch between recharging the aquifer and receiving water that is discharged from the aquifer.

The Des Plaines River is a regional discharge zone for the unconfined surficial aquifer. The upward gradient between monitoring wells MW-3S and MW-3D confirms that at least the shallow portion of the unconfined aquifer discharges into the Des Plaines River.

3.7 Population and Potential Receptors

The Lenz Oil site is situated in the southwestern corner of census track number 8459.00 and immediately east of census track number 8458.03 (Figure 3-15). According to the 1990 census data (DuPage County Development Department, 1992), the total populations of census tracks 8459.00 and 8458.03 are 5,483 and 4,678, respectively.

A total of 310 residential, commercial, and industrial wells were identified from the well construction records as being located within approximately two miles of the Lenz Oil site. To facilitate an evaluation of these wells, each well was placed into one of the following three categories: (1) individual wells within one mile of the site, (2) individual wells between one and two miles of the site, and (3) groups of wells within two miles of the site. The third category was necessary because the large numbers of wells in some areas made it impractical to accurately locate individual wells.

As shown on Figure 3-15, well records indicate that:

- Twenty-two (22) individual wells are located within a one-mile radius,
- Seventy-three (73) individual wells are situated between one and two miles, and
- Eight groups containing a total of 198 wells are located within two miles. Most of these wells (approximately 160) are located between one and two miles from the site.

In addition, 17 wells, located just outside the two-mile radius, were also included in the survey. Table 3-2 lists the following information for each well identified within a two-mile radius of the site: location, owner at the time of installation, date, total depth, screen material, screened interval, static water level, and geologic material opposite the screened interval. Each well was also given a unique number, which is listed on Table 3-2 and shown with the corresponding well location on Figure 3-15.

Based on our review of the water well logs, seven wells are completed in the glacial drift aquifer, and all of the remaining 303 wells are completed in the Silurian dolomite aquifer (Table 3-2). Some of the wells completed in the Silurian dolomite aquifer extend a few feet into the underlying Maquoketa shale, but none of the wells penetrate the Maquoketa shale and draw water from the underlying Cambrian-Ordovician aquifer. As discussed in Section 3.6.1, most wells that utilize the Silurian dolomite aquifer are completed within the upper 65 feet of the aquifer. In general, a steel casing is used to seal off the overlying glacial drift or alluvial deposits, and the rest of the borehole is left open.

Because ground water flows toward the southeast on the north side of the Des Plaines River Valley, all of the private wells located to the northwest of the Lenz Oil site are upgradient of the site, and are not considered potential ground water receptors. Additionally, the wells located to the southeast of the Des Plaines River Valley are hydraulically isolated from ground water passing under the Lenz Oil site and, therefore, are not considered potential ground water receptors.

The area potentially affected by ground water contamination from the Lenz Oil site is, thus, confined to the south one-half of Section 1, T37N, R11E (Figure 3-15). This area includes all of the wells between the Lenz Oil site and the Des Plaines River as well as a few wells lateral to the site. Because municipal water service was provided to all residences in the vicinity of the Lenz Oil site as part of the IEPA remedial activities conducted in 1988, none of the residents in the vicinity of the site depend on their private wells for potable water. Some of the private wells in the vicinity of the site are still used for nonpotable water.

ERM-North Central conducted an assessment of water usage for a two-mile stretch of the Des Plaines River, downstream of the Lenz Oil site. Inquiries were made to the Metropolitan Water Reclamation District and the Illinois State Water Survey regarding the types and locations of potential water users along the Des Plaines River, downstream of the site. Neither Agency was aware of any water users in the target area that withdrew water from the Des Plaines River, the Chicago Sanitary and Ship Canal, or the Illinois and Michigan Canal for drinking water purposes. However, several industries in the area obtained their process water from the Chicago Sanitary and Ship Canal. Prominent industrial users include the Union Oil Refinery at Romeoville and the Commonwealth Edison Power Plant, located directly across the Des Plaines River Valley from the Lenz Oil site. No other surface water users have been identified.

3.8 Ecology

Several wetlands, defined as low-lying marshy areas, are present within a one-mile radius of the site (Figure 3-1). All of the wetlands are located within the Des Plaines River Valley, and all appear to be perched above isolated layers of impermeable soil material. Field inspections of the wetlands closest to the site revealed that they have been reduced in size by filling activity. For example, the area mapped as a wetland to the northeast of the Lenz Oil site and south of the Atchison, Topeka, and Santa Fe Railroad appears to be completely covered with fill, with the exception of a low area on the northern portion of Corwin Lenz's property. The relatively large marshy area to the southeast of the site, across Jeans Road, appears to be partially occupied by an auto scrap yard (Figure 3-1). The extent to which this wetland has been altered by the activities of the scrap yard has not been established. Extensive, undisturbed wetlands exist at two locations on the strip of land between the Des Plaines River and the Chicago Sanitary and Ship Canal, one approximately 1,000 feet southeast of the site and the other approximately 5,000 feet southwest of the site (Figure 3-1). A large wetland area is located along the Calumet Sag Channel, approximately two miles southeast of the site (Figure 3-1).

According to the Illinois Department of Conservation's Natural Heritage Database, the presence of Federal- and State-listed endangered/threatened species in the immediate vicinity of the Lenz Oil site has not been documented. However, the following State-listed threatened/endangered species have been sighted within a five-mile radius of the site.

Common Name	Status
Pied-billed grebe	Endangered
Red-shouldered hawk	Endangered
Veery	Threatened
River otter	Endangered
Blazing star	Threatened
Hairy marsh yellow cress	Endangered
Awned sedge	Endangered
Crawe sedge	Threatened

In addition to the foregoing State-listed species, three nature preserves and five high-quality nature areas, located within a five-mile radius of the site, are legally protected by the State of Illinois. These protected areas include:

Name	Location
Cap Sauers Holding Nature Preserve	T37N, R12E, Sec. 18
Paw Paw Nature Preserve	T37N, R12E, Sec. 5
Sagawau Canyon Nature Preserve	T37N, R11E, Sec. 3
Waterfall Glen Nature Area	T37N, R11E, Sec. 9
Cap Sauers Holding Nature Area	T37N, R12E, Sec. 12
Lemont East Geological Area	T37N, R11E, Sec. 15
Paw Paw Woods Nature Area	T37N, R12E, Sec. 5
Sagawau Canyon Nature Area	T37N, R11E, Sec. 13

During the field activities at the site, the following animals were observed on or in the vicinity of the site: white-tailed deer, various species of water fowl, and woodchucks.

TABLES

TABLE 3-1

WATER LEVEL ELEVATION DATA[1]
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 1 of 4)

Location	Measuring Date 1/9/91		Measuring Date 2/26/91		Measuring Date 3/20/91		Measuring Date 4/24/91		Measuring Date 5/9/91	
	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.
G101L	16.72	594.53	17.10	594.15	15.41	595.84	14.56	596.69	15.46	595.79
G101M	17.47	594.58	16.30	595.75	16.15	595.90	15.31	596.74	16.21	595.84
G101D	17.67	593.31	16.34	594.64	15.41	595.57	14.44	596.54	15.37	595.61
G102L	10.24	591.39	9.65	591.98	8.02	593.61	7.69	593.94	8.69	592.94
G102D	11.18	591.23	10.60	591.81	8.98	593.43	8.64	593.77	9.66	592.75
G104L	dry	dry	4.73	597.87	3.22	599.38	3.12	599.48	4.24	598.36
G104D	8.40	593.98	8.04	594.34	7.03	595.35	6.23	596.15	7.12	595.26
G106L (2)	11.66	591.42	9.54	593.54	6.87	596.21	10.00	593.08	8.92	594.16
G106DR	xxx	xxx	xxx	xxx	xxx	xxx	9.74	593.57	10.86	592.45
MW01S	xxx	xxx	xxx	xxx	6.95	595.96	6.21	596.70	7.17	595.74
MW01D	xxx	xxx	xxx	xxx	7.21	594.93	6.28	595.86	8.84	593.30
MW02S	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	7.95	595.31
MW02D	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	9.73	592.93
MW03S	xxx	xxx	xxx	xxx	xxx	xxx	5.18	592.84	6.54	591.48
MW03D	xxx	xxx	xxx	xxx	xxx	xxx	4.71	593.19	5.83	592.07
MW04S	xxx	xxx	xxx	xxx	7.04	596.34	7.09	596.29	7.97	595.41
MW04D	xxx	xxx	xxx	xxx	9.63	593.20	8.78	594.05	10.16	592.67
MW05S (2)	xxx	xxx	xxx	xxx	8.22	595.73	7.91	596.04	8.85	595.10
MW05D	xxx	xxx	xxx	xxx	10.81	593.13	10.01	593.93	11.37	592.57
MW06S	xxx	xxx	xxx	xxx	xxx	xxx	0.71	593.36	1.63	592.44
MW06D	xxx	xxx	xxx	xxx	xxx	xxx	3.10	592.88	4.26	591.72
MW07S	xxx	xxx	xxx	xxx	xxx	xxx	15.18	593.11	16.31	591.98
MW07D	xxx	xxx	xxx	xxx	xxx	xxx	14.47	593.54	15.80	592.21
MW08S	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
RIVER:SG1	xxx	xxx	xxx	xxx	xxx	xxx	5.05	604.73	21.78	588.00
DITCH U:SG2	xxx	xxx	xxx	xxx	xxx	xxx	0.71	596.37	1.02	596.06
DITCH D:SG3	xxx	xxx	xxx	xxx	xxx	xxx	0.94	596.05	0.79	596.20

TABLE 3-1

WATER LEVEL ELEVATION DATA(1)
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 2 of 4)

Location	Measuring Date 6/24/91		Measuring Date 7/30/91		Measuring Date 8/27/91		Measuring Date 9/27/91		Measuring Date 10/30/91	
	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.
G101L	16.82	594.43	18.58	592.67	19.14	592.11	19.39	591.86	17.18	594.07
G101M	17.55	594.50	19.34	592.71	19.90	592.15	20.16	591.89	17.90	594.15
G101D	16.76	594.22	18.43	592.55	18.97	592.01	19.21	591.77	17.24	593.74
G102L	10.83	590.80	12.00	589.63	12.28	589.35	12.27	589.36	7.72	593.91
G102D	11.80	590.61	12.90	589.51	13.14	589.27	13.12	589.29	8.67	593.74
G104L	8.14	594.46	dry	dry	10.25	592.35	dry	dry	3.04	599.56
G104D	8.61	593.77	10.20	592.18	10.72	591.66	10.88	591.50	8.72	593.66
G106L (2)	10.62/11.28	592.61	11.93/12.88	591.15	12.35/13.37	590.73	12.49/13.62	590.59	10.47/11.55	592.61
G106DR	12.56	590.75	13.62	589.66	13.90	589.41	13.83	589.48	10.29	593.02
MW01S	8.60	594.31	10.45	592.43	11.00	591.91	11.20	591.71	7.96	594.95
MW01D	10.54	591.60	11.95	590.16	12.14	590.00	12.18	589.96	8.78	593.36
MW02S	9.71	593.55	11.42	591.81	11.96	591.30	12.15	591.11	7.13	596.13
MW02D	11.43	591.23	12.72	589.91	12.91	589.75	12.94	589.72	9.42	593.24
MW03S	8.38	589.64	9.06	588.93	9.22	588.80	9.15	588.87	4.72	593.30
MW03D	6.54	591.36	8.88	588.99	8.75	589.15	8.73	589.17	5.15	592.75
MW04S	9.52	593.86	11.27	592.08	11.80	591.58	11.96	591.42	6.57	596.81
MW04D	11.85	590.98	13.02	589.78	13.25	589.58	13.25	589.58	9.71	593.12
MW05S (2)	10.47/11.56	593.48	12.16/12.91	591.76	12.65/13.18	591.30	12.76/13.27	591.19	9.91	594.04
MW05D	13.06	590.88	14.16	589.75	14.42	589.52	14.45	589.49	10.84	593.10
MW06S	3.96	590.11	4.80	589.24	4.96	589.11	4.86	589.21	0.35	593.72
MW06D	6.01	589.97	6.90	589.05	7.07	588.91	7.00	588.98	3.[illegible]9	592.59
MW07S	18.05	590.24	19.04	589.22	19.24	589.05	19.22	589.07	15.66	592.63
MW07D	17.52	590.49	18.51	589.47	18.72	589.29	18.72	589.29	15.34	592.67
MW08S	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
RIVER:SG1	nd	nd	21.58	588.20	21.60	588.18	21.58	588.20	18.15	591.63
DITCH U:SG2	nd	nd	dry	dry	dry	dry	dry	dry	dry	dry
DITCH D:SG3	nd	nd	dry	dry	dry	dry	dry	dry	dry	dry

TABLE 3-1

WATER LEVEL ELEVATION DATA[1]
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 3 of 4)

Location	Measuring Date 11/21/91		Measuring Date 12/23/91		Measuring Date 1/28/92		Measuring Date 2/19/92		Measuring Date 3/19/92	
	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.	Depth to Water	Piezometric Surface Elev.
G101L	17.06	594.19	16.75	594.50	17.48	594	17.21	594.04	16.71	594.54
G101M	17.80	594.25	17.50	594.55	18.23	594	17.95	594.10	17.45	594.60
G101D	17.02	593.96	16.66	594.32	17.42	594	17.15	593.83	16.60	594.38
G102L	8.75	592.88	9.13	592.50	10.46	591	9.44	592.19	9.48	592.15
G102D	9.72	592.69	10.10	592.31	11.40	591	10.39	592.02	10.40	592.01
G104L	3.12	599.48	3.00	599.60	3.67	599	3.10	599.50	4.75	597.85
G104D	8.56	593.82	8.35	594.03	9.13	593	8.78	593.60	8.26	594.12
G106L (2)	10.82/12.00	592.26	10.98/12.20	592.10	10.65/11.97	592	10.23/10.28	592.80	10.26	592.82
G106DR	10.95	592.36	11.35	591.96	12.34	591	11.58	591.73	11.42	591.89
MW01S	8.36	594.55	8.38	594.53	9.10	594	8.71	594.20	8.34	594.57
MW01D	9.30	592.84	9.50	592.64	10.52	592	9.88	592.26	9.56	592.58
MW02S	8.84	594.42	9.05	594.21	9.90	593	9.17	594.09	9.10	594.16
MW02D	10.07	592.59	10.40	592.26	11.37	591	10.56	592.10	10.30	592.36
MW03S	5.87	592.15	6.67	591.35	7.79	590	6.69	591.33	6.68	591.34
MW03D	5.82	592.08	6.29	591.61	7.28	591	6.44	591.46	6.28	591.62
MW04S	8.92	594.46	9.15	594.23	9.82	594	9.43	593.95	9.16	594.22
MW04D	9.31	593.52	10.75	592.08	11.73	591	11.02	591.81	10.75	592.08
MW05S (2)	10.72/11.82	593.23	10.92/11.90	593.03	10.69/11.90	593	10.15/11.03	592.92	11.10	592.85
MW05D	11.54	592.40	11.90	592.04	12.93	591	12.12	591.82	11.91	592.03
MW06S	1.85	592.22	1.96	592.11	3.45	591	2.54	591.53	2.35	591.72
MW06D	4.09	591.89	4.62	591.36	5.64	590	4.76	591.22	4.58	591.40
MW07S	16.29	592.00	16.77	591.52	17.75	591	16.91	591.38	16.72	591.57
MW07D	15.89	592.12	16.30	591.71	17.30	591	16.52	591.49	16.33	591.68
MW08S	xxx	xxx	xxx	xxx	xxx	xxx	8.69	593.79	8.23	594.25
RIVER:SG1	18.60	591.18	19.55	590.23	20.60	589	19.45	590.33	19.40	590.38
DITCH U:SG2	flooded	flooded	fz	fz	fz	fz	fz	fz	nd	nd
DITCH D:SG3	flooded	flooded	fz	fz	fz	fz	fz	fz	nd	nd

TABLE 3-1

WATER LEVEL ELEVATION DATA[1]
LENZ OIL SITE
LEMONT, ILLINOIS

Notes:

[1] Elevation presented in feet above mean sea level.
[2] "Depth to Water" colums shows (depth to oil/depth to water). "Piezometer Surface Elev." column shows the corrected elevation of the water table.

Key:

XXX = Data point did not exist
nd = Data collection accidently ommitted in the field
fz = Frozen water prohibited data collection
dry = No water present in well

TABLE 3-2
PRIVATE WELL DATA (1)
LENZ OIL SITE
LEMONT, ILLINOIS
(Page 1 of 8)

ERM No.	County No.	Town-ship	Range	Section (1/4)	Location	Owner	Date Completed	Total Depth	Screen Material	Screened Interval	Water Level	Geologic Material
1		38N	11E	36 (SE)	15 W 218 87TH ST (SE,SW,SE)	BURR OAK DEVLP	6/13/89	220	OPEN	106-220	99	ROCK
2	26532	38N	11E	36 (SE)	5025 S. SEELEY (SW,SE,SE)	ROBERT NERI	4/24/81	180	OPEN	90-180	100	LS
3	2910	38N	11E	36 (SW)	JAROS RESUB LOT #4	RELIABLE CONST	7/27/72	170	OPEN	146-170	100	ROCK
4	1723	38N	11E	35 (SE)	DOWNER'S GROVE TWP (SE,SE,SE)	TORRICK	1941	160	OPEN?	114-160		ROCK
5	23670	38N	11E	35 (SE)	9 S 666 MEADOWBROOK DR	RELIABLE CONST	3/20/74	170	OPEN	148-170	48	LS
6	27892	38N	11E	35 (SE)	8421 MEADOWBROOK DR	RICHARD PATTON	8/3/87	240	OPEN	154-240	140	LS
7	28261	38N	11E	35 (SE)	10 S 131 LEONARD (SE,SE,SE)	HAMLET STEPHENS	8/20/88	190	OPEN	125-190	50	LS
8		38N	11E	35 (SW)	8425 MEADOWBROOK (LOT #10)	GENE VINEYARD	8/10/76	150	OPEN		119	LS
9	960	38N	11E	35 (SW)	TLE #66 (S/2,SW,SW)	JOHN HUINER	1/29/68	180	OPEN?	138-180	75	LS
10	1717	38N	11E	35 (SW)	TRI-STATE VILLAGE (E/2,SW)	CASINO BELLOTA	1948	25	CEMENT	10-25		SAND/CLAY
11	1719	38N	11E	35 (SW)	(TSV) 279 ROSE ST (E/2,SW)	STANLEY FRYZA	1948	36	CEMENT	10-36		SAND
12	1720	38N	11E	35 (SW)	(TSV) 407 JANET AVE (E/2,SW)	LESTER LARSON	1948	26	CEMENT	10-26		SAND/CLAY
13	1721	38N	11E	35 (SW)	(TSV) JANET AVE (E/2,SW)	FRANK POLKA	1948	32	CEMENT	10-32		SAND
14	1798	38N	11E	35 (SW)	(TSV) LOT #8 (SE,SW)	TSV DEVELOPMENT	1941	206	OPEN?	136-206		LS
15	2910	38N	11E	35 (SW)	JAROS RE-SUB	RELIABLE CONST	3/7/72	170	OPEN	146-170	100	ROCK
16	24482	38N	11E	35 (SW)	TLE LOT #70 (SW,SW)	THOMAS JANSKY	11/25/75	220	OPEN	120-220	120	LS
17	24589	38N	11E	35 (SW)	(TSV) LOT #1 (E/2,SW)	JOSEPH GAREST,JR	6/22/76	165	OPEN	112-165	85	LS
18	24812	38N	11E	35 (SW)	TIMBERLAKE ESTATES LOT #62	PARRISH CONST.	9/15/76	160	OPEN	125-160	28	LS
19	25811	38N	11E	35 (SW)	9 S 750 WILLIAM DR (SE,SW,SW)	HENRY PAETSCH	9/23/76	235	OPEN?	180-235	85	LS
20	26526	38N	11E	35 (SW)	8627 MEADOWBROOK (SW,NW,SE)	CLIFF WARTHEN	8/2/80	205	OPEN	141-205	129	LS
21	26527	38N	11E	35 (SW)	9 S 274 BROOKBANK (SW,SW,SW)	CHARLES ZAK	6/24/82	220	OPEN	122-220	79	LS
22	27078	38N	11E	35 (SW)	17 W 155 W 87TH (TLE #81)	GEORGE SKUNDRNA	6/24/85	200	OPEN	150-200	99	LS
23	28299	38N	11E	35 (SW)	207 BONNIE BRAE (SW,SE,SW)	CHRIS SALAMOUSKI	10/4/88	185	OPEN	108-185	89	LS
24	3105	38N	11E	34 (E/2)	TLE LOT #81 (E/2,E/2)	JAS RAY	2/13/73	180	OPEN	108-180	100	ROCK
25	3366	38N	11E	34 (E/2)	(TLE #8) 7946 TENNESSEE(E/2,E/2)	FRANK ZELIP	9/15/73	180	OPEN	106-180	100	LS
26	24358	38N	11E	34 (E/2)	8220 CLARENDON HILLS RD	RICHARD CECHOWSKI	10/15/75	190	OPEN	130-190	80	LS
27		38N	11E	34 (SE)	NW 16 FRONTAGE RD (SE,SE,SE)	ART SALLNER?	10/9/74	165	OPEN	94-165	74	LS
28		38N	11E	34 (SE)	TIMBER LAKE ESTS. LOT #47	PARRISH CONST	2/15/72	140	OPEN	120-140	58	ROCK
29		38N	11E	34 (SE)	350 MEADOW CT (TLE #67)	MIKE YAO	9/9/75	160	OPEN	115-160	83	LS
30	84	38N	11E	34 (SE)	DU PAGE CO. (SW,SW,SE)	A F BUILDERS	1957	170	OPEN	112-170	58	LS
31	85	38N	11E	34 (SE)	DU PAGE CO.(SE,SE)	A F BUILDERS	1955	185	OPEN	145-185	75	LS
32	2280	38N	11E	34 (SE)	9 S 580 CLARENDON HILLS(NE,SE,SE)	KETTELL CONST	10/20/71	127	STL CAS?	100-127	89	GRAVEL
33	24254	38N	11E	34 (SE)	(TLE) 9 S 709 LORRAINE (SE,SE)	ROBERT ZINTAK	10/7/75	180	OPEN	138-180	108	LS
34	24809	38N	11E	34 (SE)	(TLE)9 S 642 LORRAINE(S/2,SE,SE)	ACCURATE DESIGN	9/13/76	200	OPEN	148-200	80	LS
35	26518	38N	11E	34 (SE)	(TLE LOT #47) 8015 ALABAMA	ALBERT SUCHA	10/19/79	195	OPEN	123-195	100	LS
36	26519	38N	11E	34 (SE)	(TLE) 8035 TENNESSEE (NW,NE,SE)	ROBERT SVATEK	10/9/80	185	OPEN	116-185	84	LS
37	26525	38N	11E	34 (SE)	8425 MEADOWBROOK DR	GENE VINEYARD	4/1/76	220?	OPEN	150-220?	119	LS
38		38N	11E	34 (SW)	1033 FRONTAGE RD (SW,SE,SW)	CHESTER GASAWAY	2/24/84	200	OPEN	97-200	79	LS
39	905	37N	12E	6 (NW)	87TH & COUNTY LINE RD (NW,NE,NW)	CATALINA CONST	3/2/68	160	OPEN	84-160	36	LS
40	25841	37N	12E	6 (NW)	8901 COUNTY LINE RD (SW,NW,NW)	WILLIAM JOHNSTON	11/23/77	160	OPEN	103-160	98	LS
41	29367	37N	12E	6 (NW)	NE 1/4 OF SW 1/4 OF NW 1/4	GEORGE MATOCHA	8/19/79	140	OPEN	90-140	58	LS

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ERM No.	County No.	Town-ship	Range	Section (1/4)	Location	Owner	Date Completed	Total Depth	Screen Material	Screened Interval	Water Level	Geologic Material
42	29368	37N	12E	7 (NW)	133 E. OGDEN AVE ? (NW,NW)	ROWELL CHEMICAL	10/13/83	100	OPEN	40-100	87	LS
43	25394	37N	12E	7 (SW)	FOREST PRESERVE (NW,NW,SW)	ARGONNE LAB	9/23/76	173	OPEN	128-173	140	LS
44	25395	37N	12E	7 (SW)	FOREST PRESERVE (NW,NW,SW)	ARGONNE LAB	9/28/76	280	OPEN	116-280	99	LS/SH
45	25396	37N	12E	7 (SW)	FOREST PRESERVE (NW,NW,SW)	ARGONNE LAB	9/20/76	201	OPEN	160-201	98	LS
46	2144	37N	12E	18 (NW)	U. OF C. EXP. STA. (NW,NW,NW)	IL WATER SURVEY	1/44	308	OPEN	171-308	153	LS
47	25397	37N	12E	18 (NW)	FOREST PRESERVE (NW,NW,NW)	ARGONNE LAB	9/17/76	215	OPEN	175-215	160	LS
48		37N	11E	1 (NE)	11519 ROSEMERE (NE,NE,NE)	EDWARD OTTO	11/28/69	180	OPEN	100-180	115	LS
49		37N	11E	1 (NE)	87TH ST. S. OF HINSDALE (SW,NE)	ED MALICK		150	OPEN	56-150		ROCK
50		37N	11E	1 (NE)	15 W 051 87TH (NE,NW,NE)	CARL LAUDONDO	11/18/83	185	OPEN	77-185	59	LS
51		37N	11E	1 (NE)	15 W 620 89TH (SW,NW,NE)	VAL ADAMKUS	10/2/79	220?	OPEN	133-220?	136	LS
52	1111	37N	11E	1 (NE)	CVE (NE,SE,NE)	TERRY HECTOR	1/30/68	71	OPEN	44-71	18	LS
53	1118	37N	11E	1 (NE)	CVE #33 (E/2,NE)	TERRY HECTOR	5/68	80	OPEN	52-80	31	SH?
54	1119	37N	11E	1 (NE)	CVE #20 (E/2,NE)	TERRY HECTOR	5/68	80	OPEN	52-80	21	SH?
55	1120	37N	11E	1 (NE)	CVE #1 (E/2,NE)	TERRY HECTOR	5/68	75	OPEN	48-75	24	SH?
56	1121	37N	11E	1 (NE)	CVE #44 (E/2,NE)	TERRY HECTOR	5/68	79	OPEN	42-79	27	SH?
57	1122	37N	11E	1 (NE)	CVE #38 (E/2,NE)	TERRY HECTOR	5/68	75	OPEN	46-75	26	SH?
58	1123	37N	11E	1 (NE)	CVE #18 (E/2,NE)	TERRY HECTOR	6/68	80	OPEN	46-80	28	LS
59	1564	37N	11E	1 (NE)	SE 1/4 OF SW 1/4 OF NE 1/4	KOTELLA		120	OPEN?	75-120?		ROCK
60	3430	37N	11E	1 (NE)	NE 1/4 OF SE 1/4 OF NE 1/4	DIORIO BLDRS	10/18/73	213	OPEN	80-213	59	ROCK
61	23693	37N	11E	1 (NE)	11 S 420 DREW (NW,NE,NE)	RICHARD SOMOLIK	1/7/74	113	OPEN	74-113	19	LS
62	23863	37N	11E	1 (NE)	15 W 101 87TH ST.(NE,NE,NE)	RONALD CHOCHOLA	9/23/74	200	OPEN	70-200	60	LS
63	23908	37N	11E	1 (NE)	15 W 101 87TH ST.(NE,NE,NE)	RONALD CHOCHOLA	12/4/74	160	OPEN	68-160	60	LS
64	24228	37N	11E	1 (NE)	8750 S. COUNTY LINE(SW,NW,NE)	JOHN PARTEPELO	7/22/75	200	OPEN	60-200	38	ROCK
65	25015	37N	11E	1 (NE)	NW 1/4 OF SE 1/4 OF NE 1/4	PAT ALDERTINI	12/2/76	205	OPEN	136-205	138	LS
66	25220	37N	11E	1 (NE)	15 W 101 87TH ST.(NE,NE,NE)	RONALD CHOCHOLA	11/2/78	180	OPEN	60-180	98	LS
67	28428	37N	11E	1 (NE)	15 W 305 91ST ST. (S/2,NE)	CAM KRAUSE	7/20/84	200	OPEN	97-200	70	LS
68		37N	11E	1 (NW)	8900 S. MADISON (NW,SW,NW)	EDWARD PRINER	1/4/82	200	OPEN	126-200	60	ROCK
69		37N	11E	1 (NW)	15 W 620 89TH ST (PAYNE'S #1)	RICHARD REDIEHS	9/10/79	220	OPEN	125-220	130	LS
70	2129	37N	11E	1 (NW)	SPACE VALLEY SUBD LOT #19	CHATEAU HOMES	6/28/71	130	OPEN	100-130	70	ROCK
71	3128	37N	11E	1 (NW)	10 S 245 MADISON ST.(NW,SW,NW)	G. RODRIGUEZ	3/3/73	180	OPEN	120-180	130	LS
72	3480	37N	11E	1 (NW)	OAKDALE LOT #19 (SW,NW)	JACK WHEELER	11/5/73	200	OPEN	130-200	112	ROCK
73	25221	37N	11E	1 (NW)	(OD #37)10 S 230 GRANT(NE,SW,NW)	GARY HERMES	8/24/78	188	OPEN	120-188	120	LS
74	25222	37N	11E	1 (NW)	ERICKSON MANOR SUBD. LOT #1	PONSTERN BLDRS	10/31/78	190	OPEN	110-190	38	LS
75	27169	37N	11E	1 (NW)	15 W 720 89TH ST (SW,NW,NW)	WILLIAM NORRIS	11/5/85	250	OPEN	126-250	125	LS
76		37N	11E	1 (SE)	87TH ST S. OF HINSDALE (NW,SE)	WILLIAM WASHER		120	OPEN	94-120		ROCK
77		37N	11E	1 (SE)	87TH ST S. OF HINSDALE (SW,SE)	CRADEVILL		54	OPEN	40-54		ROCK
78	1565	37N	11E	1 (SE)	W/2 OF NE 1/4 OF SE 1/4	JOHN RACEK	5/37	160	OPEN?	60-160	60	SIL DOL
79		37N	11E	1 (SW)	1818 S. CLARENCE (OAK RIDGE #3)	TONY SARACCO	8/26/82	200	OPEN	124-200	69	ROCK
80	1032	37N	11E	1 (SW)	10 S 441 MADISON ST.(NW,NW,SW)	KETTEL CONST	5/14/68	140	OPEN	105-140	94	LS
81	1061	37N	11E	1 (SW)	10 S 445 GLENN (SV LOT #3)	SEFARA BLDRS	11/15/68	160	OPEN	85-160	50	LS
82	1185	37N	11E	1 (SW)	SPACE VALLEY LOT #1	SEFARA BLDRS	5/10/69	160	OPEN	100-160	90	LS
83	1241	37N	11E	1 (SW)	SPACE VALLEY LOT #4	SEFARA BLDRS	10/15/69	160	OPEN	100-160	80	LS

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84	2033	37N	11E	1 (SW)	10 S 580 GLENN DR.(SW,NW,SW)	SEFARA BLDRS.	5/24/71	180	OPEN	85-180	65	ROCK
85	2120	37N	11E	1 (SW)	91ST & MADISON (NW,NW,SW)	THOMAS BEURSKEN	7/3/71	170	OPEN	110-170	59	ROCK
86	2130	37N	11E	1 (SW)	SPACE VALLEY #6 (NW,SW,SW)	SEFARA BLDRS.	7/27/71	265	OPEN	133-265	138	ROCK
87	2309	37N	11E	1 (SW)	(AD#40)11 S 344 MADISON(W/2,SW)	ROBERT NEWMAN	11/23/71	130	OPEN	45-130	10	LS
88	2430	37N	11E	1 (SW)	10 S 607 GLENN DR (NW,SW,SW)	KETTEL CONST	3/22/72	165	OPEN	120-165	104	LS
89	2472	37N	11E	1 (SW)	SW 1/4 OF SW 1/4 OF SW 1/4	RELIABLE CONST	4/28/72	120	OPEN	105-120	78	ROCK
90	3129	37N	11E	1 (SW)	(SV #5)10 S 675 GLENN(NW,SW,SW)	SWANSON	3/3/73	190	OPEN	118-190	130	LS
91	3228	37N	11E	1 (SW)	SPACE VALLEY SUBD LOT #31	CASTLE BLDRS	7/2/73	160	OPEN	100-160	50	ROCK
92	3229	37N	11E	1 (SW)	10 S 581 MADISON ST (SV #35)	LEROY SKRIDEN	5/25/73	180	OPEN	116-180	110	LS
93	3431	37N	11E	1 (SW)	NORTH 100', LOT #61	RELIABLE CONST	7/22/73	135	OPEN	120-135	*53	LS
94	3479	37N	11E	1 (SW)	SPACE VALLEY LOT #20	PAUL SMITH	11/6/73	160	OPEN	102-160	115	LS
95	24318	37N	11E	1 (SW)	15 W 531 89TH (SW,SE,SW)	STEVENS BLDRS.	10/16/75	190	OPEN	125-190	80	LS
96	24579	37N	11E	1 (SW)	SPACE VALLEY SUBD. LOT #32	ALEX McCRACKEN	5/17/76	180	STL CAS?	0-180	58	LS
97	24747	37N	11E	1 (SW)	SE 1/4 OF NE 1/4 OF SW 1/4	DAVE ERICKSON	10/15/76	150	OPEN	90-150	60	LS
98	24748	37N	11E	1 (SW)	(SV #2)10 S 526 GLENN(SW,NW,SW)	DONALD HALL	11/3/76	185	OPEN	130-185	130	LS
99	25093	37N	11E	1 (SW)	SANITARY DIST. (AD LOT #61)	EDWARD McCLUSKY	5/27/77	190	OPEN	126-190	75	LS
100	25094	37N	11E	1 (SW)	(SV #11)9532 HENNITTA(W/2,SW)	CARL RUMER	5/27/77	180	OPEN	126-180	78	LS
101	25949	37N	11E	1 (SW)	NW 1/4 OF SW 1/4 OF SW 1/4	JOE DePAULO	7/6/79	160	OPEN	103-160	69	LS
102	27215	37N	11E	1 (SW)	10 S 601 GARFIELD RD.(NE,NW,SW)	ROBERT BIAGETTI	10/22/85	125	OPEN	66-125	29	LS
103	23616	37N	11E	1 (SW?)	ASSESSMENT DIVISION LOT #40	JERUTIS BLDRS	2/11/74	125	OPEN	41-125	20	LS
104	23617	37N	11E	1 (SW?)	ASSESSMENT DIVISION LOT #7	JERUTIS BLDRS.	2/18/74	150	OPEN	80-150	60	LS
105	1112	37N	11E	1? (NE)	CVE #27 (SE,SE,NE)	TERRY HECTOR	1/30/68	74	OPEN	46-74	20	LS
106		37N	11E	2 (NE)	16 W 140 89TH ST (SE,NW,NE)	GARY KNOLBLOCH	10/12/82	220	OPEN	163-220	119	LS
107	897	37N	11E	2 (NE)	9012 SKYLINE DR (SW,SW,NE)	VIOLA WOLFF	8/14/67	192	OPEN	126-192	108	ROCK
108	1972	37N	11E	2 (NE)	(TSV) SKYLINE DR. (SW,NE)	HAZEL POKALL	1948	34	CEMENT	10-34		SAND/GRAVEL
109	2131	37N	11E	2 (NE)	TSV LOT #13	PARK LANE REALTY	6/27/71	200	OPEN	150-200	78	ROCK
110	2310	37N	11E	2 (NE)	TRI-STATE VILLAGE LOT #12	W. WILLIAMSON	11/23/71	200	OPEN	158-200	88	ROCK
111	2357	37N	11E	2 (NE)	(TSV #24)8915 PALISADES(W/2,NE)	R. ZIMA	11/15/71	225	OPEN	170-225	149	ROCK
112	2963	37N	11E	2 (NE)	TSV LOT #4	BALDUCCI	9/19/72	160	OPEN	143-160	65	ROCK
113	3038	37N	11E	2 (NE)	TSV LOT #3	JOHN BRETZ	11/6/72	195	OPEN	175-195	78	ROCK
114	3211	37N	11E	2 (NE)	TRISTATE VILLAGE LOT #13	BALDUCCI	5/22/73	155	OPEN	118-155	80	ROCK
•115	3275	37N	11E	2 (NE)	TSV LOT #5	PHIL BIESEMEYER	6/19/73	180	OPEN	144-180	60	ROCK
116	3276	37N	11E	2 (NE)	TSV LOT #6	PHIL BIESEMEYER	6/19/73	180	OPEN	138-180	60	ROCK
117	23566	37N	11E	2 (NE)	40 CUSTER ST. (NE,SE,NE)	ED JEANS	12/18/73	225	OPEN	137-225	160	LS
118	23802	37N	11E	2 (NE)	143 HILLSIDE LANE (NW,NE)	JURE POZEK	8/27/74	220	OPEN	155-220	130	LS
119	24059	37N	11E	2 (NE)	TSV LOT #15	EARL CLYDE	4/1/75	180	OPEN	125-180	33	LS
120	24060	37N	11E	2 (NE)	8805 PALISADES (TSV #32)	RONALD MAROUSEK	4/2/75	205	OPEN	155-205	125	LS
121	24319	37N	11E	2 (NE)	SE 1/4 OF SW 1/4 OF NE 1/4	JZ CONST	11/20/75	180	OPEN	115-180	80	LS
122	24450	37N	11E	2 (NE)	10 S 330 MADISON (SE,SE,NE)	DIORIO BLDRS	3/29/76	175	OPEN	115-175	130	LS
123	24580	37N	11E	2 (NE)	534 OGDEN (TSV LOT #19)	PARK LANE REALTY	5/4/76	180	STL CAS?	0-180	124	LS
124	25015	37N	11E	2 (NE)	8700 S. COUNTY LINE (NW,SE,NE)	PAT ALDERTINI	12/2/76	205	OPEN	139-205	138	LS
125	25225	37N	11E	2 (NE)	16 W 310 91ST (SW,SW,NE)	R.T. CHADNER	11/15/78	205	OPEN	150-205	115	LS
126	25227	37N	11E	2 (NE)	16 W 184 89TH (SW,NE,NE)	LEAHY HOME BLDRS	11/18/77	250	OPEN	153-250	147	LS

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127	25228	37N	11E	2 (NE)	10950 URSULA DR (NW,NE,NE)	ST & ASSOCS	12/19/77	165	OPEN	155-165	98	LS
128		37N	11E	2 (NW)	8101 COUNTY LINE RD (W/2,NW)	GEORGE REDIEHS	4/15/77	125	OPEN	40-125	4	LS
129		37N	11E	2 (NW)	17 STIRRUP CT (TLE #47)	ROBERT DELMASTRO	7/18/79	220	OPEN	138-220	118	LS
130	24749	37N	11E	2 (NW)	9053 O'NEIL (TLE #15)	RUDY DURHAM	9/30/76	200	OPEN	147-200	85	LS
131	3230	37N	11E	2 (NW)	10 S 60 LAKEWOOD (TLE #55)	FRANK GAWEL	5/29/73	190	OPEN	137-190	90	LS
132	3101	37N	11E	2 (NW)	TSV LOT #13	TOM FISHER	3/30/73	180	OPEN	160-180	80	ROCK
133	1147	37N	11E	2 (NW)	16 W 466 91ST ST (S/2,NW)	JOSEPH BOBEK	3/14/69	190	OPEN	150-190	138	LS
134	23995	37N	11E	2 (NW)	10 S 070 RTE.83 (NE,NE,NW)	GEORGE MATOCHA	2/5/75	205	OPEN	160-205	100	LS
135	23996	37N	11E	2 (NW)	16 W 471 HILLSIDE (SE,NE,NW)	FRANK RUZICKA	2/6/75	205	OPEN	160-205	100	LS
136	24750	37N	11E	2 (NW)	16 W 556 HILLSIDE (SE,NE,NW)	MELVIN MILLER	9/16/76	190	OPEN	135-190	80	LS
137	83	37N	11E	2 (NW)	NE 1/4 OF SE 1/4 OF NW 1/4	A.J. BUILDERS	1957	175	OPEN	125-175	70	LS
138	1062	37N	11E	2 (S/2)	SPACE VALLEY LOT #2	SEFARA BLDRS.	5/23/68	100	STL CAS?	0-100	90	SAND/GRAVEL
139	2356	37N	11E	2 (SE)	SPACE VALLEY LOT #24	CREATIVE BLDRS	1/19/72	260	OPEN	119-260	88	ROCK
140	2473	37N	11E	2 (SE)	16 W 125 89TH (SE,NE,SE)	JOSEPH DACKA	3/11/72	240	OPEN	142-240	79	ROCK
141	2480	37N	11E	2 (SE)	SPACE VALLEY SUBD. LOT #7	BOLT BROS.	5/31/72	126	OPEN	120-126	60	ROCK
142	25224	37N	11E	2 (SE)	NE 1/4 OF SE 1/4 OF SE 1/4	ROBERT BAKER	8/24/77	200	OPEN	147-200	34	ROCK
143	25226	37N	11E	2 (SE)	10 S 934 MADISON (SE,SE,SE)	HANDCRAFTED HOMES	11/28/78	200	OPEN	127-200	115	LS
144	27540	37N	11E	2 (SE)	10420 S. KNOX (SW,SE,SE)	ROBERT SWAYKA	1/27/87	180	OPEN	130-180	85	ROCK
145	1161	37N	11E	2 (SE)	CENTER OF NW 1/4 OF SE 1/4	FRED LENZ	7/15/68	205	OPEN	140-205	90	NIAG LS
146	1162	37N	11E	2 (SE)	CENTER OF NW 1/4 OF SE 1/4	WINSTON LENZ	8/1/68	205	OPEN	140-205		NIAG LS
147	2069	37N	11E	2 (SE)	94TH & JACKSON (SW,SW,SE)	RELIABLE CONST	3/23/71	180	OPEN	162-180	79	ROCK
148	2132	37N	11E	2 (SE)	16 W 375 94TH ST (SW,SW,SE)	RELIABLE CONST.	7/16/71	180	OPEN	160-180	139	ROCK
149	2474	37N	11E	2 (SE)	16 W 185 89TH ST (SE,NW,SW,	JOSEPH SERAFIN	5/23/72	240	OPEN	138-240	79	ROCK
150	3039	37N	11E	2 (SE)	OAK HILL ESTATES LOT #14	RELIABLE CONST	10/27/72	190	OPEN	150-190	28	ROCK
151	3095	37N	11E	2 (SE)	94TH & OAK HILL (OH LOT #9)	NICK BATISTICH	1/19/73	140	OPEN	111-140	89	ROCK
152	3167	37N	11E	2 (SE)	OAK HILL ESTATES LOT #25	RELIABLE CONST.	4/19/73	180	OPEN	166-180	60	ROCK
153	3394	37N	11E	2 (SE)	OAK HILL LOT #19	PARRISH CONST.	10/5/73	160	OPEN	147-160	60	ROCK
154	23618	37N	11E	2 (SE)	16 W 253 94TH ST (OH #12)	JAMES McGUIRE	12/10/73	200	OPEN	147-200	129	ROCK
155	23694	37N	11E	2 (SE)	16 W 302 W 94TH ST (SE,NW,SE)	TIM ZANGRI	5/10/74	180	OPEN	137-180	58	ROCK
156	23741	37N	11E	2 (SE)	510 DOWNERS DR (OAK HILL #7)	NICK BATISTICH	5/24/74	190	OPEN	128-190	75	LS
157	23864	37N	11E	2 (SE)	OAK HILL ESTS. LOT #3 (NW,SW,SE)	DENNIS BUMBER	9/6/74	170	OPEN	160-170	78	LS
158	24229	37N	11E	2 (SE)	(OH #1) 93RD PLACE (SW,SE)	BLDG & CONST	9/23/75	190	OPEN	130-190	115	LS
159	27472	37N	11E	2 (SE)	16 W 300 94TH PL (SE,SW,SE)	NEDELJKO NIHOLIC	8/29/86	205	OPEN	145-205	139	LS
160	27473	37N	11E	2 (SE)	382 LORCH (SE,SW,SE)	RICHARD SABLICK	2/12/87	180	OPEN	126-180	79	ROCK
161	27653	37N	11E	2 (SE)	OAK HILL #10 (SW,SW,SE)	WARTHEN PUMP	5/1/87	205	OPEN	153-205	109	LS
162	27701	37N	11E	2 (SE)	2650 BREWER LANE (SE,SW,SE)	CALLAHAN & ASSOC	4/13/87	180	OPEN	120-180	79	ROCK
163	27791	37N	11E	2 (SE)	16 W 267 94TH ST (SE,SW,SE)	DEBBIE ROCKABRAND	6/3/87	180	OPEN	148-180	79	ROCK
164	28092	37N	11E	2 (SE)	16 W 267 93RD (SE,NW,SE)	BILL ALLEN BLDRS	2/22/83	180	OPEN	132-180	99	ROCK
165	28204	37N	11E	2 (SE)	2927 S 48TH AVE (NW,SW,SE)	BILL CARSTEN	6/16/88	200	OPEN	145-200	89	LS
166		37N	11E	2 (SW)	10 S 731 JACKSON ST (SE,NW,SW)	CHESTER GASAWAY	5/7/80	220	OPEN	160-220	130	LS
167	63	37N	11E	2 (SW)	NW 1/4 OF NW 1/4 OF SW 1/4	RAMLIN ROSE SOUTH	7/18/67	1610	OPEN	512-1610	594	LS/SH/SS
168	907	37N	11E	2 (SW)	NW 1/4 OF NW 1/4 OF SW 1/4	RAMLIN ROSE SOUTH	1967	249	OPEN	108-249	78	LS
169	2058	37N	11E	2 (SW)	NW 1/4 OF NE 1/4 OF SW 1/4	RAMBLIN ROSE	10/4/70	300	OPEN	120-300	77	LS/SH
170	2339	37N	11E	2 (SW)	16 W 301 94TH ST (S/2,S/2)	ROBERT HABADA	1/3/72	220	OPEN	156-220	78	ROCK
171	25223	37N	11E	2 (SW)	9454 S JACKSON	DENNIS ANDRYSIAK	9/14/78	180	OPEN	150-180	45	LS

TABLE 3-2
PRIVATE WELL DATA (1)
LENZ OIL SITE
LEMONT, ILLINOIS
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ERM No.	County No.	Town-ship	Range	Section (1/4)	Location	Owner	Date Completed	Total Depth	Screen Material	Screened Interval	Water Level	Geologic Material
172		37N	11E	3 (NE)	16 W 451 HILLSIDE (SW,NW,NE)	HANS DEV CO	7/1/89	220	OPEN	140-220	100	LS
173	503	37N	11E	3 (NE)	TIMBERLAKE ESTS #94 (NE,NE,NE)	HENRY JOUKEMA	1959	191	OPEN	153-191	90	LS
174	1567	37N	11E	3 (NE)	10 S. 140 LEONARD (SW,NW,NE)	IVAN PUMMEL	1966	150	OPEN	115-150	55	LS
175	2088	37N	11E	3 (NE)	TIMBERLAKE ESTS #38 (NE,NE,NE)	CHESTER GASAWAY	7/13/71	150	OPEN	130-150	40	ROCK
176	23803	37N	11E	3 (NE)	17 W 268 HILLSIDE (SW,NE,NE)	WILLIAM CALABRETTA	8/22/74	190	OPEN	136-190	75	LS
177	25230	37N	11E	3 (NE)	4736 MAIN ST. (TLE #88)	KELLOG-BENET BLDR	5/20/78	160	OPEN	147-160	78	LS
178	27078	37N	11E	3 (NE)	17 W 155 W. 87TH ST. (NE,NE)	GEORGE SKUDRNA	6/24/85	200	OPEN	150-200	99	LS
179	28002	37N	11E	3 (NE)	4741 CUMNOR RD (NE,NE,NE)	JACK SPINNEY	10/26/87	200	STL CAS?	0-200	89	LS
180	28429	37N	11E	3 (NE)	NE 1/4 OF NW 1/4 OF NE 1/4	DAVE KELLEY	12/4/84	245	OPEN	145-245	50	LS
181	24320	37N	11E	3 (NW)	10 S 020 LORRAINE (N/2,NE,NW)	ACCURATE DESIGN	11/5/75	200	OPEN	148-200	90	LS
182	25229	37N	11E	3 (NW)	16 W 424 HILLSIDE (SE,NE,NW)	NICK BATISTICH	10/20/77	220	OPEN	147-220	150	LS
183	27543	37N	11E	3 (NW)	NW 1/4 OF NW 1/4 OF NW 1/4	DU PAGE CO	10/20/86	325	OPEN	101-325		LS/SH
184		37N	11E	3 (SE)	87TH ST S OF HINSDALE (NW,SE)	MAXWELL HOWARD	1932	138	OPEN	126-138		ROCK
185	24381	37N	11E	3 (SE)	NW 1/4 OF NW 1/4 OF SE 1/4	DU PAGE CO FOREST	4/28/76	150	OPEN	105-150		LS
186		37N	11E	3 (SW)	87TH ST S OF HINSDALE (NE SW)	LOUIS REDIEHS		103	OPEN	86-103		ROCK
187		37N	11E	3 (SW)	DU PAGE CO (SE,SW)	ARNOLD REDISH	1924	91	OPEN	69-91		ROCK
188		37N	11E	3 (SW)	DU PAGE CO (SE,SW)	MALIKOWSKI	1914	85	OPEN	63-85	13	ROCK
189		37N	11E	3 (SW)	DU PAGE CO (NE,SW)	SMITH		100	OPEN	96-100		ROCK
190	654	37N	11E	3 (SW)	NE 1/4 OF SW 1/4 OF SW 1/4	ARGONNE LAB		110	OPEN?	80-110	37	LS
191	1566	37N	11E	3 (SW)	SW 1/4 OF SW 1/4 OF SW 1/4	ARGONNE LAB	1950	1595	OPEN?	64-1595		LS/SH/SS
192		37N	11E	4 (NE)	ARGONNE LAUNCHER AREA (NE,NE)	U S ARMY	1955	230	OPEN	140-230		
193		37N	11E	4 (NE)	881 W ST CHARLES RD (NE,SE,NE)	FOREST PRESERVE	11/15/78	150	OPEN	110-150	58	LS
194	1568	37N	11E	4 (NE)	DOWNER'S GROVE TWP. (NW NW,NE)	WELCH		115				ROCK
195	218	37N	11E	4 (SE)	NE 1/4 OF SW 1/4 OF SE 1/4	ARGONNE LAB	2/59	341	OPEN	115-341	84	SIL/ORD DOL
196	656	37N	11E	9 (NE)	SW 1/4 OF SE 1/4 OF NE 1/4	ARGONNE LAB		186	OPEN	86-186		LS
197	1571	37N	11E	9 (NE)	NE 1/4 OF NW 1/4 OF NE 1/4	ARGONNE LAB	6/64	331	OPEN	110-331	88	LS/SH
198	1572	37N	11E	9 (NE)	NE 1/4 OF NW 1/4 OF NE 1/4	ARGONNE LAB	6/64	331	OPEN	108-331	85	LS/SH
199	658	37N	11E	9 (SE)	SW 1/4 OF NW 1/4 OF SE 1/4	ARGONNE LAB		141	OPEN	86-141	101	LS
200	659	37N	11E	9 (SE)	NE 1/4 OF NE 1/4 OF SE 1/4	ARGONNE LAB	1940	240	OPEN?	95-240	60	LS
201	660	37N	11E	9 (SE)	NE 1/4 OF SE 1/4 OF SE 1/4	ARGONNE LAB	1921	148	OPEN?	86-148	111	LS
202	661	37N	11E	9 (SE)	NE 1/4 OF SE 1/4 OF SE 1/4	ARGONNE LAB	1934	111	OPEN?	91 111		LS
203	662	37N	11E	10 (NW)	NW 1/4 OF SE 1/4 OF NW 1/4	ARGONNE LAB	1934	97	OPEN?	63-97	22	LS
204	664	37N	11E	10 (NW)	SE 1/4 OF SE 1/4 OF NW 1/4	ARGONNE LAB		160	OPEN	160-168		LS
205	665	37N	11E	10 (NW)	NW 1/4 OF SW 1/4 OF NW 1/4	ARGONNE LAB		168	OPEN?	160-168	52	LS
206	1509	37N	11E	10 (NW)	SW 1/4 OF NE 1/4 OF NW 1/4	ARGONNE LAB	1948	300	OPEN	61-300	70	SIL/ORD LS/SH
207	1510	37N	11E	10 (NW)	NE 1/4 OF SE 1/4 OF NW 1/4	ARGONNE LAB	1948	284	OPEN	75-284	75	SIL/ORD LS

TABLE 3-2
PRIVATE WELL DATA (1)
LENZ OIL SITE
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ERM No.	County No.	Town-ship	Range	Section (1/4)	Location	Owner	Date Completed	Total Depth	Screen Material	Screened Interval	Water Level	Geologic Material
208	2395	37N	11E	10 (NW)	SW 1/4 OF SW 1/4 OF NW 1/4	ARGONNE LAB		202	OPEN?	140-202	69	LS
209	26215	37N	11E	10 (SE)	12 W LAKE ST (SE,NW,SE)	DU PAGE CO	3/5/81	200	OPEN	77-200	59	ROCK/SH
210	26216	37N	11E	10 (SE)	12 W LAKE ST (SE,NW,SE)	DU PAGE CO	1/23/81	160	OPEN	70-160	59	ROCK
211	663	37N	11E	10 (SW)	NW 1/4 OF SE 1/4 OF SW 1/4	ARGONNE LAB		95	OPEN?	50-95	72	LS
212	714	37N	11E	10 (SW)	SW 1/4 OF SW 1/4 OF SW 1/4	ARGONNE LAB	1949	155	OPEN	115-155	107	LS
213	510	37N	11E	11 (NE)	ASSESSMENT DIV (SW,SW,NE)	ALLAN BECKMAN	1959	155	OPEN	105-155	80	LS
214	1262	37N	11E	11 (NE)	11519 ROSEMERE (NE,NE,NE)	EDWARD OTTO	11/29/69	180	OPEN	100-180	115	LS
215	1276	37N	11E	11 (NE)	16 W 220 97TH (SE,NW,NE)	CARL PETERSON	9/10/69	150	OPEN	115-150	90	LS
216	2268	37N	11E	11 (NE)	ASSESSMENT DIV.LOT #47 (SE,NE)	TONY ADRECUS	10/13/71	180	OPEN	142-180	78	ROCK
217	2961	37N	11E	11 (NE)	ASSESSMENT LOT #38 (SE,NW,NE)	RICHARD FLACS	9/27/72	180	OPEN	96-180	60	ROCK
218	3319	37N	11E	11 (NE)	SPRING ACRES #2 (LOT #5)	ARAZAN BLDRS	7/30/73	190	OPEN	137-190	40	ROCK
219	3320	37N	11E	11 (NE)	SPRING ACRES LOT #4	JOHN HUSEK	7/30/73	185	OPEN	137-185	80	ROCK
220	23620	37N	11E	11 (NE)	11 S 058 PALISADES (N/2,NE)	C. SROKA	12/10/73	180	OPEN	140-180	129	ROCK
221	23696	37N	11E	11 (NE)	11 S 060 MADISON (NE,NE,NE)	RELIABLE CONST	4/3/74	140	OPEN	66-140	50	LS
222	23828	37N	11E	11 (NE)	11 S 204 MADISON (NE,NE)	JOHN MANGAN	7/31/74	100	OPEN	84-100	63	LS
223	23997	37N	11E	11 (NE)	11 S 375 JEANS RD.(LOT #41)	RICHARD FLACS	12/13/74	100	OPEN	40-100	33	LS
224	23998	37N	11E	11 (NE)	EDW. SASS ASSESS. (NE,NE,NE)	NICK MICHAELS	12/19/74	145	OPEN	84-145	58	LS
225	24232	37N	11E	11 (NE)	10 S 571 MADISON (ES #34)	NICK MICHAELS	9/24/75	150	OPEN	105-150	60	LS
226	25096	37N	11E	11 (NE)	ASSESSMENT DIV. (LOT #41)	TRISKA & FLACS	5/31/77	100	OPEN	40-100	8	LS
227	25239	37N	11E	11 (NE)	16 W 235 97TH (NE,SW,NE)	CHESTER GASAWAY	10/18/77	130	OPEN	80-130	5	LS
228	26217	37N	11E	11 (NE)	9700 S MADISON (SE,SE,NE)	JOHN COURTNEY	10/9/79	145	OPEN	42-145	7	LS
229	26219	37N	11E	11 (NE)	1138 TIMBER LANE (JEANS RD SUB)	EARL MAIER	11/12/80	110	OPEN	40-110	5	LS
230	26220	37N	11E	11 (NE)	11 S 010 JACKSON ST.(NW,NW,NE)	EMILIE RANNIN	9/24/81	185	OPEN	140-185	119	LS
231	26356	37N	11E	11 (NE)	SPRING ACRES LOT #6 (NW,NE)	DON SCHULTZ	9/11/84	185	OPEN	132-185	99	LS
232	944	37N	11E	11 (SE)	DU PAGE CO ? (NE,NW,SE)	THOMAS REDIEHS	1967	100	OPEN	43-100	20	LS
233	27164	37N	11E	11 (SE)	JEANS RD? (SE,NW,SE)	CORWIN LENZ	9/13/85	125	OPEN	42-125	14	LS
234	1275	37N	11E	11 (SW)	18 W 515 99TH ST (SE,NE,SW)	NICK BATISTICH	11/13/69	165	OPEN	133-165	105	LS
235	26218	37N	11E	11 (SW)	NW 1/4 OF NW 1/4 OF SW 1/4	DU PAGE CO	1/14/83	200	OPEN	75-200	39	ROCK
236	2949	37N	11E	12 (NW)	SPACE VALLEY SUB (LOT #13)	SEFARA BLDRS	7/13/72	180	OPEN	132-180	60	ROCK
237	23804	37N	11E	12 (NW)	11 S 165 MADISON (NW,NW,NW)	JIM ADCOCK	8/22/74	120	OPEN	52-120	8	LS
238	25097	37N	11E	12 (NW)	8101 COUNTY LINE RD (W/2,NW)	GEORGE REDIEHS	4/15/77	125	OPEN	40-125	4	LS
239	26221	37N	11E	12 (SW)	TREATMENT PLANT (NW,NW,SW)	DU PAGE CO	11/21/83	145	OPEN	32-145	5	LS
240	28430	37N	11E	12 (SW)	15700 S LaGRANGE RD (NW,NW,SW)	KERR TRAILER	1/9/85	150	OPEN	40-150	4	ROCK
241		37N	11E	13 (NW)		MURPHY	1947	75	OPEN?	31-75		ROCK
242		37N	11E	13 (NW)		TOM MURPHY		79	OPEN?	31-79		ROCK
243		37N	11E	13 (NW)		TOM MURPHY		92	OPEN?	55-92		ROCK
244		37N	11E	13 (SW)		GEORGE RENBONE		40	OPEN?	5-40		ROCK
245		37N	11E	13 (SW)	SAG BRIDGE	AMY KIRK		68	OPEN?	13-68		ROCK
246		37N	11E	13 (SW)		SAG SCHOOL	1915	69	OPEN	20-69		ROCK

TABLE 3-2
PRIVATE WELL DATA (1)
LENZ OIL SITE
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ERM No.	County No.	Town-ship	Range	Section (1/4)	Location	Owner	Date Completed	Total Depth	Screen Material	Screened Interval	Water Level	Geologic Material
247		37N	11E	14 (NE)	117TH & ARCHER (NW,SE,NE)	HILDA KIRK	7/28/71	70	OPEN	40-70	44	LS/SH
248		37N	11E	14 (NE)	LEMONT TWP	HEYWORTH	1915	35	OPEN	27-35		ROCK
249		37N	11E	14 (NE?)	CONST CAMP FOR CANAL	HEYWORTH	1915	49	OPEN	27-49		ROCK
250		37N	11E	14 (NW)		M POLAREK	1926	58	OPEN	26-58		ROCK
251	10 - 16	37N	11E	14 (NW)	CAL-SAG CHANNEL:7 SITES (S/2,NW)	CORPS OF ENGRS	<10/1/46	22-26	BORINGS			LS
252		37N	11E	14 (S/2)	CHICAGO-JOLIET RD (S/2,S/2)	AL ALBRECHT	3/10/75	120	OPEN	63-120	50	LS
253		37N	11E	14 (SE)	111TH & ARCHER	MRS RUPERT	1913	60	OPEN	22-60		ROCK
254	28597	37N	11E	15 (NE)	5925 BENTLEY (NE,SE,NE)	JAMES TILLEY	8/21/84	240	OPEN	132-240	129	ROCK
255		37N	11E	15 (SE)	JOESEPH N. PEW'S SUBD (LOT #3)	JIM ADCOCK	12/20/78	105	OPEN	40-105	3	LS
256	26981	37N	11E	15 (SE)	LEMONT HIGHWAY RD (SE,SE,SE)	JOHN DEYOUND	8/22/85	145	OPEN	40-145	19	LS
257	786-792	37N	11E	15 (SE?)	DU PAGE CO ? - 7 SITES	N IL GAS CO	10/62	28-90	BORINGS?			LS
258		37N	11E	15 (SW)	BURR RIDGE (NW,SW,SW)	GENE VINEYARD	3/20/81	105	OPEN	42-105	9	LS
259	1457	37N	11E	16 (SE)	SW 1/4 OF SW 1/4 OF SE 1/4	RICHMOND BUILDERS	12/13/70	160	OPEN	127-160	18	ROCK
260		37N	11E	22 (NE)		JOHN McGRAW	1916	100	OPEN	65-100		ROCK
261		37N	11E	22 (NE)	1598 MAIN ST (SE,NW,NE)	COUNTRY CLUB	5/17/77	151	OPEN	77-151	65	LS
262	27102	37N	11E	22 (NW)	NW 1/4 OF NW 1/4 OF NW 1/4	PATRICIA STRADER	8/5/85	100	OPEN	40-100	19	ROCK
263	29293	37N	11E	22 (NW)	1134 KOTLEN (NW,NW)	RONALD BUSHMAN	9/18/84	180	OPEN	40-180	39	ROCK
264	29294	37N	11E	22 (NW)	114TH ST & WALKER RD (SW,SW,NW)	NEIL LINDBERG	10/17/79	180	OPEN	50-180	19	ROCK
265	29296	37N	11E	22 (NW)	1349 MAGIN ST. (NW,SW,NW)	EMITY McCUTCHEON	9/17/81	225	OPEN	42-225	39	LS/SH
266		37N	11E	23 (NE)	LEMONT TWP	P.J. RUPERT	1907	200	OPEN	77-200	>75	ROCK
267		37N	11E	23 (NE)	LEMONT TWP (NE,NE)	CONWAY	11/3/47	200				
268		37N	11E	23 (NE)	16 ARTESIAN-AG #16 (E/2, NE)	NICK BATISTICH	11/16/72	140	OPEN	88-140	79	ROCK
269	766	37N	11E	23 (NE)	ARCHER & BELL (E/2, NE)	E BELGRAVE	10/8/68	115	OPEN	81-115	59	ROCK
270	1374	37N	11E	23 (NE)	AG LOT #28 (SW,SE,NE)	RAY RUDIS BLDRS	9/6/71	150	OPEN	85-150	59	ROCK
271	1523	37N	11E	23 (NE)	RTE 1 WOODLANE AVE (SW,SW,NE)	KETTELL CONST	3/24/72	135	OPEN	85-135	74	LS
272	1644	37N	11E	23 (NE)	CAMPBELL ST LOT #30 (NE,SE,NE)	JAMES DEMPSEY	11/17/71	160	OPEN	84-160	59	ROCK
273	4416	37N	11E	23 (NE)	ARCHER GARDENS LOT #51	CHESTER GASAWAY	8/3/73	120	OPEN	80-120	40	ROCK
274	25384	37N	11E	23 (NE)	BELL & CAMPBELL RDS (NE,SE,NE)	ALLEN HULL BLDRS	6/7/76	100	OPEN	70-100	49	ROCK
275	25812	37N	11E	23 (NE)	AG LOT #50 (E/2, NE)	ROBERT KOLODMNSKI	7/28/77	215	OPEN	82-215	59	ROCK
276	26306	37N	11E	23 (NE)	ARCHER GARDENS LOT #2(NW,SE,NE)	FRANK PICK	9/19/77	185	OPEN	90-185	82	LS
277		37N	11E	23 (NE?)	ARCHER GARDENS LOT #38	WOHEAD BLDRS	6/27/73	130	OPEN	70-130	55	LS
278		37N	11E	23 (NW)	113TH PL. & BELL RD (E/2,NW)	K.V. BLDRS	11/2/74	170	OPEN	100-170	64	ROCK
279	2087	37N	11E	23 (NW)	SE 1/4 OF SE 1/4 OF NW 1/4	COUNTRY CLUB	7/63	297	OPEN	87-297	52	LS/SH
280	2088	37N	11E	23 (NW)	SW 1/4 OF SW 1/4 OF NW 1/4	COUNTRY CLUB	10/20/66	300	OPEN	60-200	43	LS/SH
281		37N	11E	23 (SW)	LEMONT TWP	JOHN DOMINICK	1915	150	OPEN	115-150	50	ROCK
282	585	37N	11E	23 (SW)	SE 1/4 OF NW 1/4 OF SW 1/4	COUNTRY CLUB	10/20/67	335	OPEN	112-335	73	LS
283	29297	37N	11E	23 (SE)	BELL RD (SE,NE,SE)	JOE KEIM BLDRS	1/10/80					

FIGURES

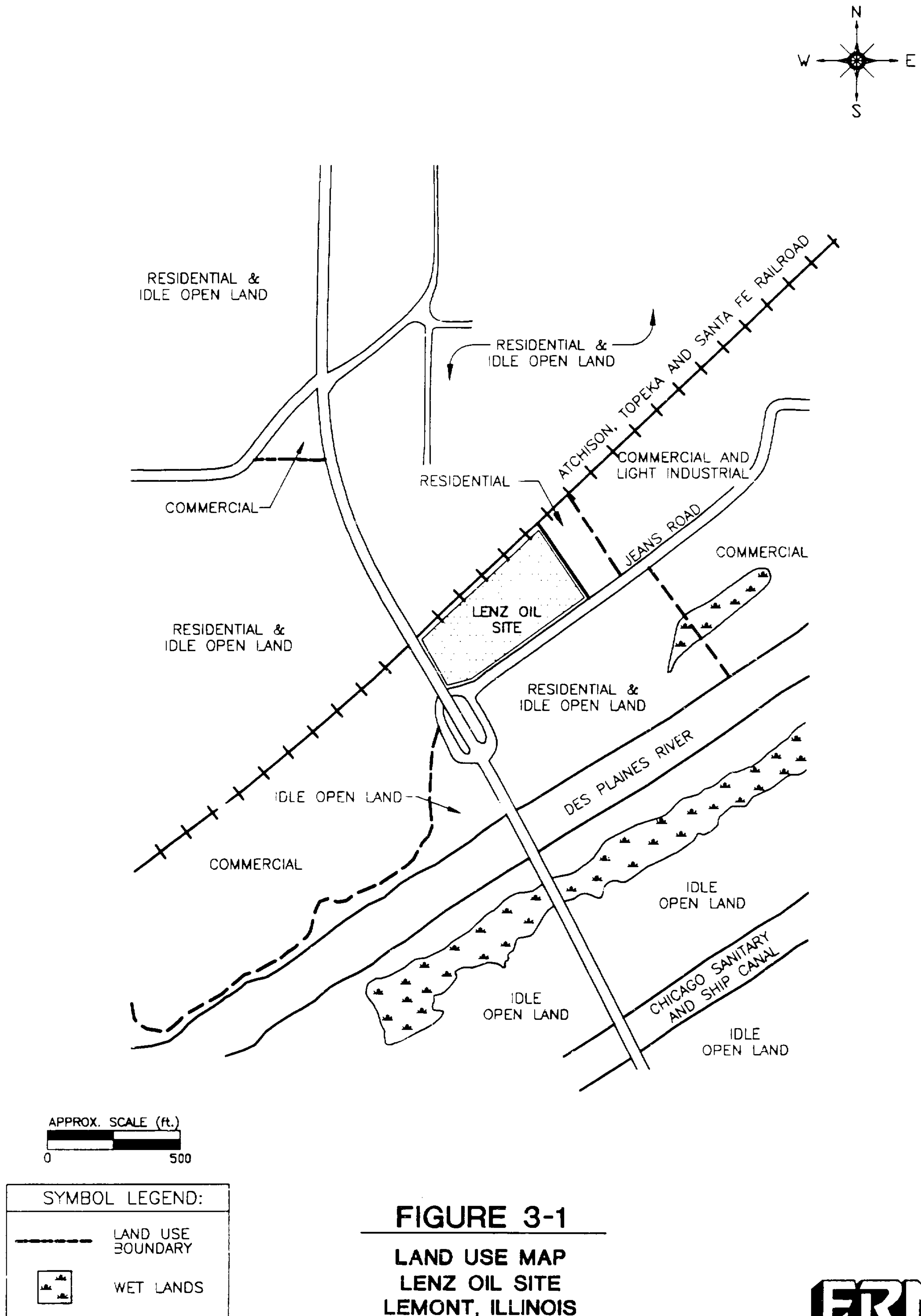


FIGURE 3-1

LAND USE MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

PROJECT: 0452-7 | REPORT: RI | DRAWN: MO- | CHECKED: | DATE: 6/30/92 | APPROVED: | CLIENT NAME: LENZ OIL

TABLE 3-2
PRIVATE WELL DATA (1)
LENZ OIL SITE
LEMONT, ILLINOIS

ERM No.	County No.	Town-ship	Range	Section (1/4)	Location	Owner	Date Completed	Total Depth	Screen Material	Screened Interval	Water Level	Geologic Material
284	2089	37N	11E	24 (N/2)	RTE 83 E SAG BRIDGE (N/2,N/2)	CCC CAMP AT LEMONT	1944	160	OPEN	53-160	35	LS
285		37N	11E	24 (NW)	LEMONT TWP (SW,NW)	PETE MICHEK	1913	135	OPEN	89-135		ROCK
286		37N	11E	24 (NW)	LEMONT TWP (NE,NW)	L MATHY	1927	130	OPEN	50-130	25	ROCK
287		37N	11E	24 (NW)	LEMONT TWP (NW,NW)	JOHN JALINSKI	1915	33	OPEN	30-33		BKN LS
288		37N	11E	24 (NW)	59 RUSTY RD (SW,SE,NW)	BILL RIORDAN	9/9/88	205	OPEN	79-205	69	LS
289		37N	11E	24 (NW)	EQUEST ESTS LOT #94	BIG M BLDRS	12/3/79	155	OPEN	63-155	49	ROCK
290	25386	37N	11E	24 (NW)	DINEFF & PISHONS (NW,NW,NW)	NICK BATISTICH	10/13/76	180	OPEN	52-180	43	LS
291	25814	37N	11E	24 (NW)	115TH & DINEFF (S/2,SW,NW)	DAN BENIGNE	5/26/78	160	OPEN	73-160	100	LS
292	26117	37N	11E	24 (NW)	RTE 83 & ARCHER & 111TH (NW,NW)	KORZENECHI & CO	10/17/78	155	OPEN	42-155	29	LS
293	26309	37N	11E	24 (NW)	BELL RD & RTE 171 (NW,NW,NW)	JOE ROGOWSKI	5/5/78	185	OPEN	55-185	44	LS
294	27132	37N	11E	24 (NW)	EE LOT #139	OVERSTREET BLDRS	9/16/85	160	OPEN	130-160	89	LS
295	27193	37N	11E	24 (NW)	113TH & DINEFF (SW,SW,NW)	FRANK HART	2/19/86	205	OPEN	63-205	54	LS/SH
296	27215	37N	11E	24 (NW)	EQUESTRIAN LOT #151 (NE,NW,NW)	DENNIS IRELAND	12/4/85	185	OPEN	98-185	49	LS
297	27473	37N	11E	24 (NW)	115TH DINEFF (SW,SW,NW)	SCOTT OLDANI	7/9/87	200	OPEN	63-200	44	LS
298	27504	37N	11E	24 (NW)	EQUEST. ESTS. #97 (SE,NW,NW)	JOHN FARANO	7/10/87	205	OPEN	60-205	29	LS
299	28203	37N	11E	24 (NW)	EE LOT #13 (SW,SE,NW)	KEN LARIMER	10/15/87	205	OPEN	91-205	49	LS
300	28232	37N	11E	24 (NW)	7560 BLAZER AVE (NW,NW,NW)	FRED FIERKE	7/14/88	200	OPEN	60-200	79	ROCK
301	28608	37N	11E	24 (NW)	17239 OAK PARK (NW,NW,NW)	STARK CONST	11/28/88	300	OPEN	146-300	79	ROCK
302	28678	37N	11E	24 (NW)	1052 REPUBLIC DR (SW,SW,NW)	MARK WILSON	6/17/88	220	OPEN	101-220	42	LS
303	29819	37N	11E	24 (NW)	EE LOT #95 (NW,SE,NW)	B & K DEVLP	5/8/80	220	OPEN	65-220	59	ROCK
304		37N	11E	24 (SW)	EE LOT #64 (NW,NW,SW)	MIKE WITT	2/15/80	185	OPEN	132-180	69	ROCK
305		37N	11E	24 (SW)	EE LOT #8 (NW,NW,SW)	DONNA KRAMER	4/5/79	200	OPEN	101-200	49	LS
306	2090	37N	11E	24 (SW)	LEMONT TWP (NW,NE,SW)	MIKE FLYNN	1939	260	OPEN?	100-260	45	ROCK
307	25816	37N	11E	24 (SW)	EE LOT #28 (NW,NW,SW)	CULTRA CONST	7/13/78	185	OPEN	118-185	89	LS
308	29303	37N	11E	24 (SW)	EE LOT #8 (NW,NW,SW)	DONNA KRAMER	4/4/79	200	OPEN	105-200	74	LS
309	29311	37N	11E	24 (SW)	EE LOT #26 (NW,NW,SW)	CARL RUMER	1/9/80	140	OPEN	116-140	74	ROCK
310	29313	37N	11E	24 (SW)	16210 OAK VALLEY TR (NE,NW,SW)	LATEERA BLDRS	6/15/69	165	OPEN	126-165	89	LS

SOURCE: Driller's logs compiled from the Illinois Geological Survey and the Illinois State Water Survey

KEY:
LS = Limestone
SH = Shale
SS = Sandstone
DOL = Dolomite
SIL = Silurian
ORD = Ordovician
NIAG = Niagran
BKN LS = Broken Limestone
STL CAS = Steel Cased

NOTE: (1) The items identified with a "?" are not well documented because of omissions in the drillers logs or questionable data

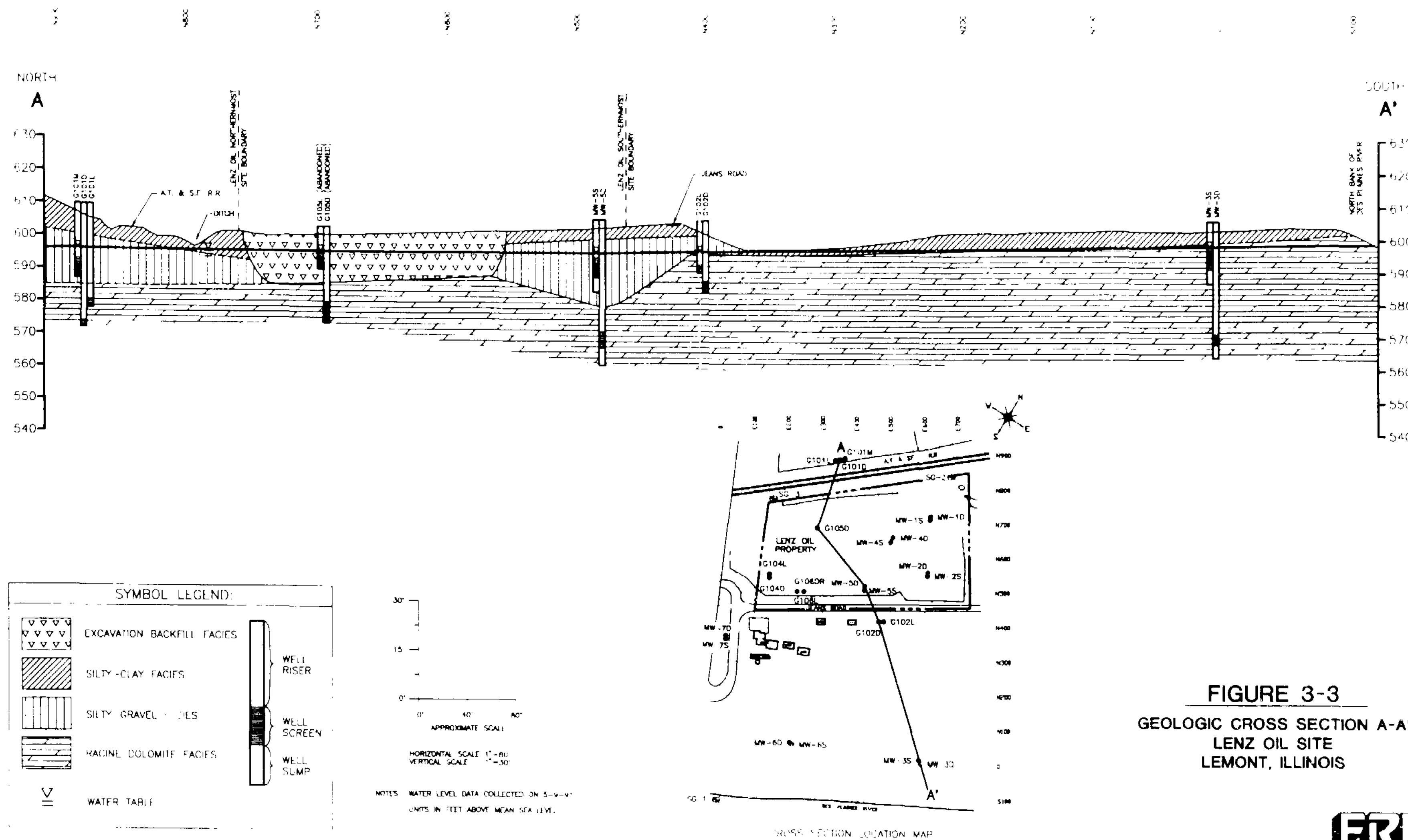
Time Stratig: System	Series	Stage	Rock Stratigraphy: Mega Group	Group	Formation	Graphic Column	Thickness Feet	Kinds of Rock
QUAT	PLEIS				(See fig 15)		0-350	Till, sand, gravel, silt, clay, peat marl loess
PENN	DESM			Kewanee	Carbondale		0-125	Shale, sandstone, thin limestone, coal
					Spoon		50-75	As above, but below No 2 Coal
MISS	VAL				Burl-Keokuk		0-700	Limestone — Only in Des Plaines Disturbance
	KIND				Hannibal			Shale, siltstone — Only in Des Plaines Disturbance
DEV	UP				Grassy Creek		0-5	Shale in solution cavities in Silurian
SILURIAN	NIAGARAN		Hunton		Racine		0-300	Dolomite, pure in reefs, mostly silty, argillaceous, cherty between reefs
					Waukesha		0-30	Dolomite, even bedded, slightly silty
					Joliet		40-60	Dolomite, shaly and red at base; white, silty, cherty above, pure at top
	ALEX				Kankakee		20-45	Dolomite, thin beds; green shale partings
					Edgewood		0-100	Dolomite, cherty, shaly at base where thick
ORDOVICIAN	CIN	RICH		Maquoketa	Neda		0-15	Oolite and shale, red
					Brainard		0-100	Shale, dolomitic, greenish gray
					Ft. Atkinson		5-50	Dolomite, green shale, coarse limestone
		MAY / ED			Scales		90-120	Shale, dolomitic, gray, brown, black
	CHAMPLAINIAN	TRENT	Ottawa	Galena	Wise Lake		70-210	Dolomite, buff, pure
					Dunleith			Dolomite, pure to slightly shaly; locally limestone
					Guttenberg		0-15	Dolomite; red specks and shale partings
		BLACKRIVERAN		Platteville	Nachusa		0-50	Dolomite and limestone, pure, massive
					Grand Detour		20-40	Dolomite and limestone; medium beds
					Mifflin		20-50	Dolomite and limestone, shaly, thin beds
					Pecatonica		20-50	Dolomite, pure, thick beds
				Ancell	Glenwood		0-80	Sandstone and dolomite, silty; green shale
					St. Peter		100-600	Sandstone, medium and fine grained; well rounded grains, chert rubble at base
	CANADIAN		Knox	Prairie du Chien	Shakopee		0-70	Dolomite, sandy; oolitic chert; algal mounds
					New Richmond		0-35	Sandstone, fine to coarse
					Oneota		190-250	Dolomite, pure, coarse grained; oolitic chert
					Gunter		0-15	Sandstone, dolomitic
CAMBRIAN	CROIXAN	TREMP			Eminence		50-150	Dolomite, sandy
					Potosi		90-220	Dolomite; drusy quartz in vugs
		FRAN			Franconia		50-200	Sandstone, glauconitic; dolomite; shale
					Ironton		80-130	Sandstone, partly dolomitic, medium grained
		DRESBACHIAN			Galesville		10-100	Sandstone, fine grained
					Eau Claire		370-570	Siltstone, dolomite, sandstone and shale, glauconitic
			Potsdam		Mt Simon		1200-2900	Sandstone, fine to coarse; quartz pebbles in some beds
PRE-CAM								Granite

FIGURE 3-2

GENERALIZED STRATIGRAPHIC COLUMN FOR THE CHICAGO AREA FROM WILLMAN, 1971

ERM

PROJECT: 0252-7 | REPORT: KI | DRAWN: MO | CHECKED: | DATE: 7/1/92 | APPROVED: | CLIENT NAME: LENZ OIL



NOTES: WATER LEVEL DATA COLLECTED ON 5-9-91
UNITS IN FEET ABOVE MEAN SEA LEVEL

CROSS SECTION LOCATION MAP

FIGURE 3-3

GEOLOGIC CROSS SECTION A-A'
LENZ OIL SITE
LEMONT, ILLINOIS

PROJECT	REPORT	DRAWN	CHECKED	DATE	APPROVED	CLIENT NAME
0252-7	RI	MO-		7/15/92		LENZ OIL

ERM

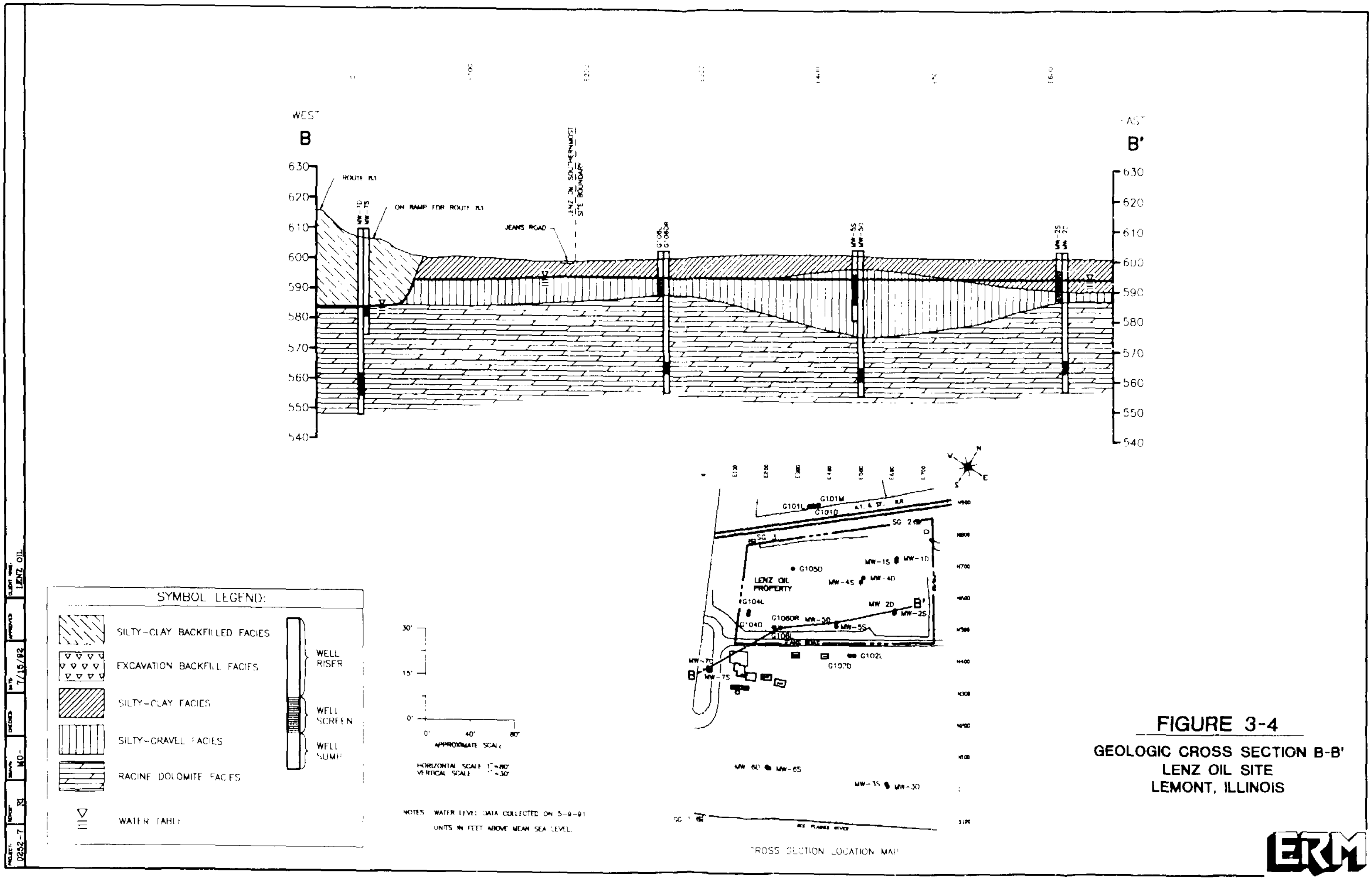
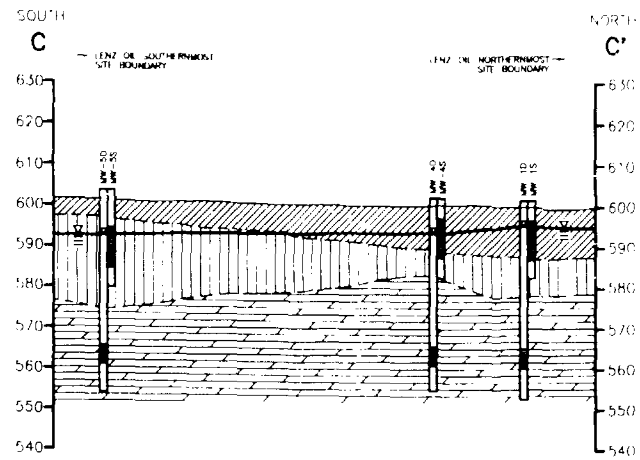


FIGURE 3-4
GEOLOGIC CROSS SECTION B-B'
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

PROJECT	REPORT	DRAWN	CHECKED	DATE	APPROVED	CLIENT NAME
0252-7	RI	MO-		7/15/92		LENZ OIL

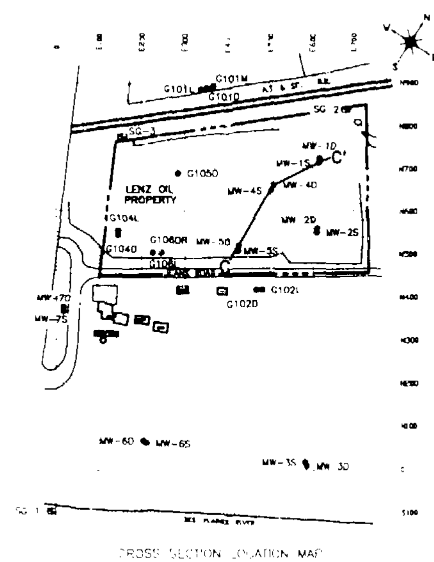


SYMBOL LEGEND

- SILTY CLAY FACIES
- SILTY-GRAVEL FACIES
- RACINE DOLOMITE FACIES
- WATER TABLE
- WELL RISER
- WELL SCREEN
- WELL SUMP

APPROXIMATE SCALE
HORIZONTAL SCALE 1"=80'
VERTICAL SCALE 1"=30'

NOTES: WATER LEVEL DATA COLLECTED ON 5-9-91
UNITS IN FEET ABOVE MEAN SEA LEVEL



CROSS SECTION LOCATION MAP

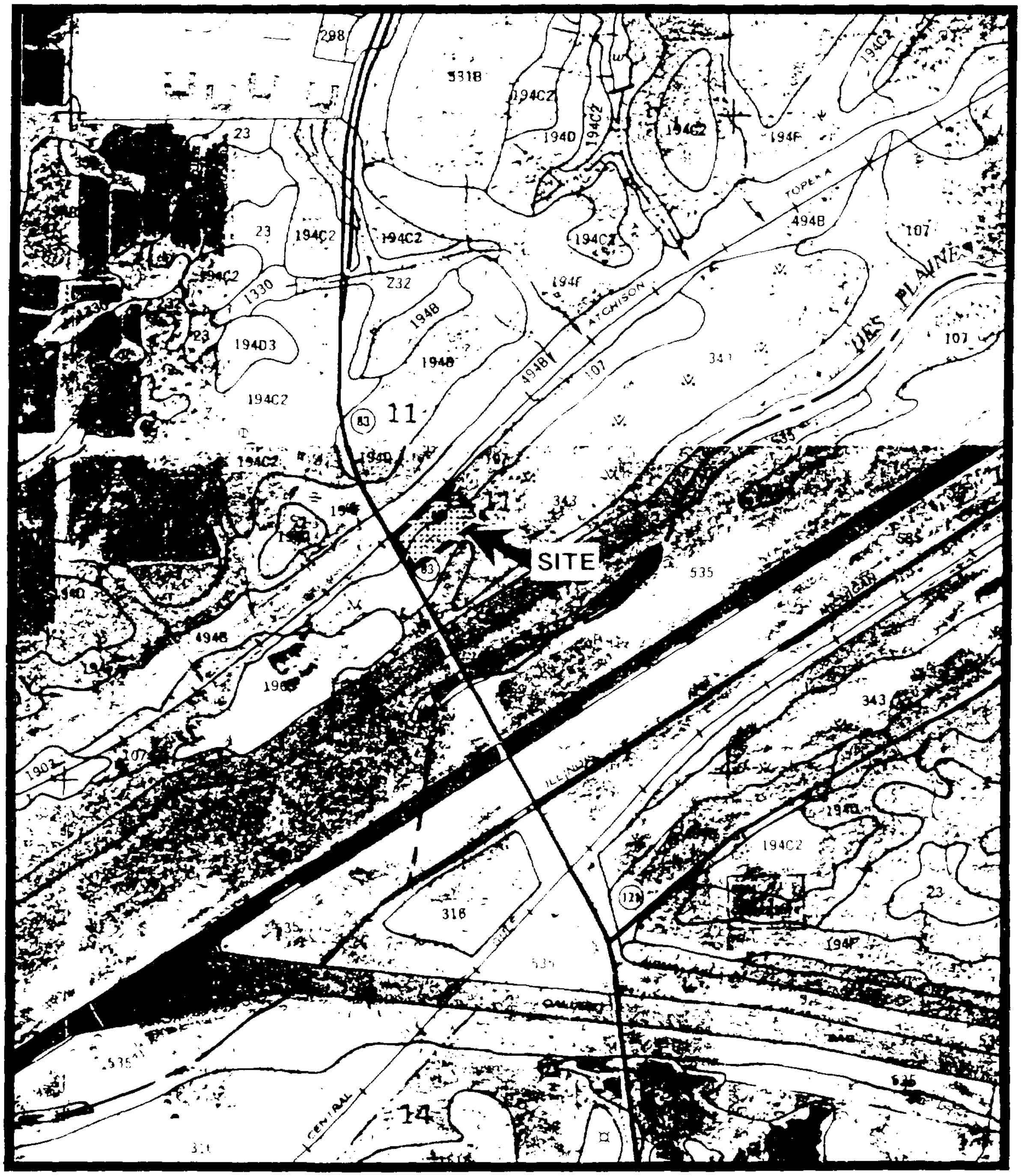
FIGURE 3-5

GEOLOGIC CROSS SECTION C-C'
LENZ OIL
LEMONT, ILLINOIS

ERM

SOIL SURVEY
ILLINOIS–DuPAGE AND COOK COUNTIES
SHEET NUMBERS 86 AND 90
1970 AND 1971

N
W E
S



SCALE 1:15840
1/2 1/4 0 1/2 MILE

SYMBOL LEGEND:

SOIL MAP SYMBOL AND NAME:

343	KANE
107	SAWMILL
494B	KANKAKEE
194	MORLEY

FIGURE 3-6
SURFICIAL SOIL MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME: LENZ OIL
APPROVED:
DATE: 10/5/92
CHECKED:
DRAWN: MO
REPORT: RI
PROJECT: 0252.7

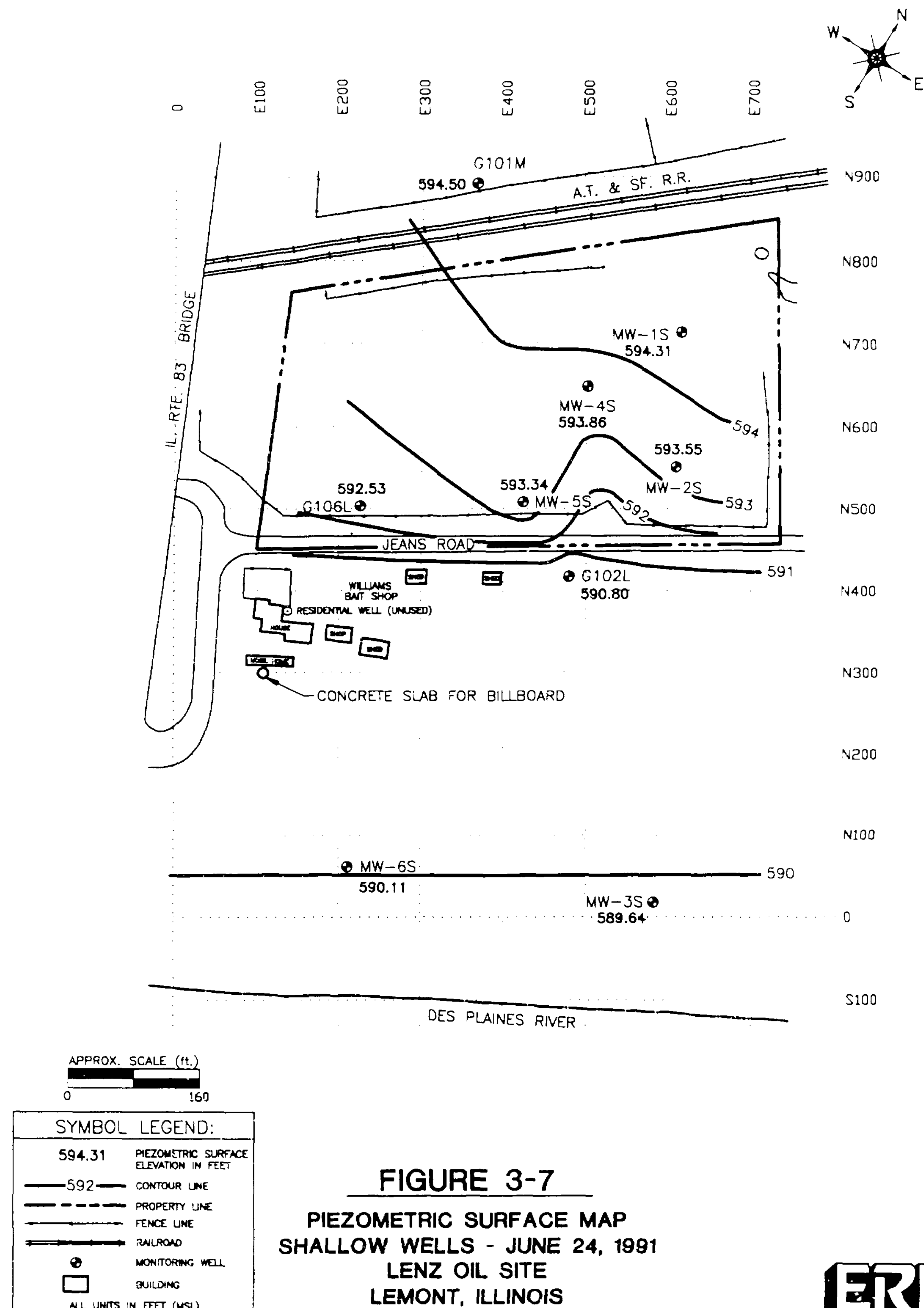
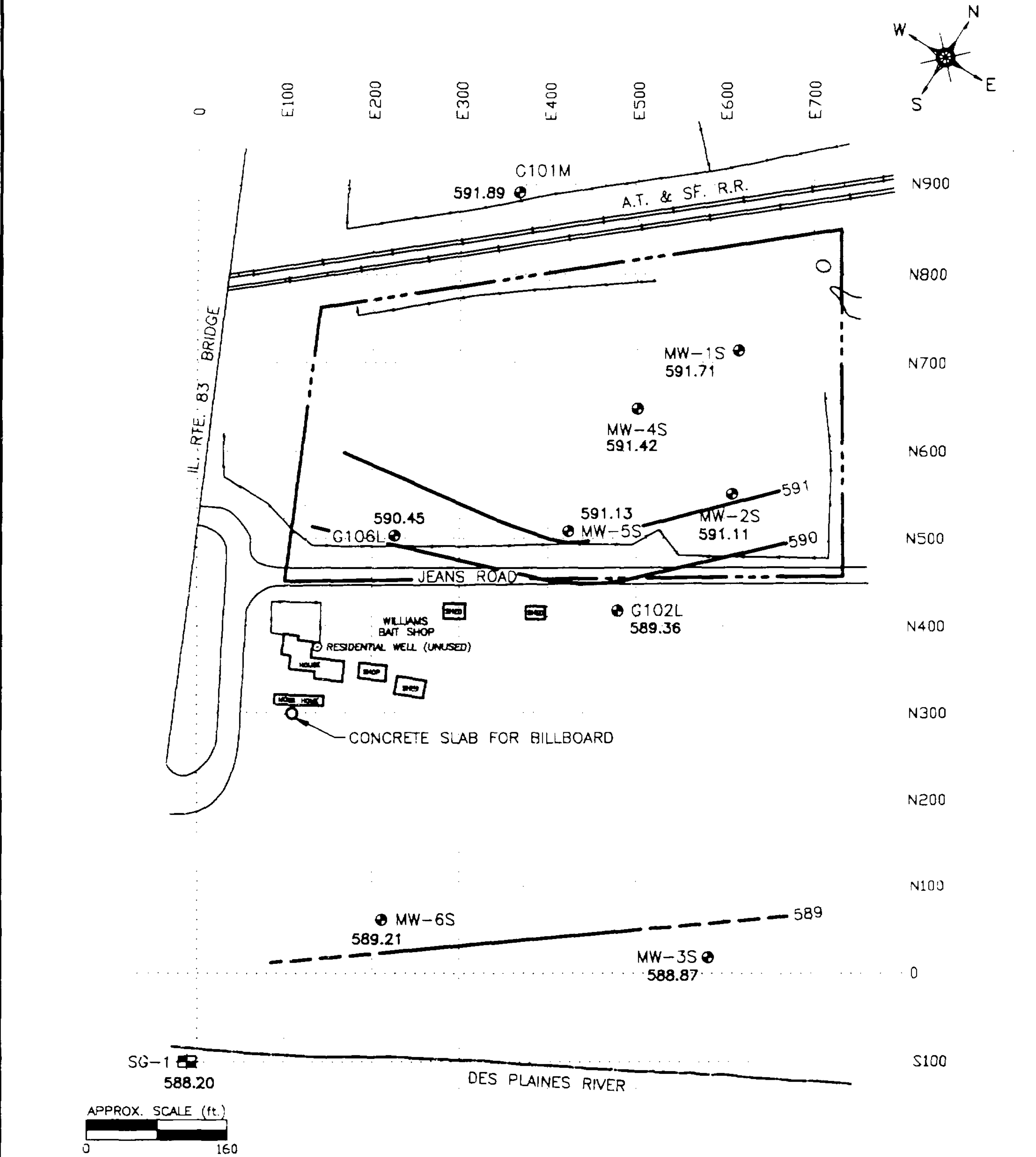


FIGURE 3-7

PIEZOMETRIC SURFACE MAP
SHALLOW WELLS - JUNE 24, 1991
LENZ OIL SITE
LEMONT, ILLINOIS

CLIENT NAME: LENZ OIL
APPROVED:
DATE: 7/1/92
CHECKED:
DRAWN: MO-
REPORT: RI
PROJECT: 0252-7

ERM



SYMBOL LEGEND:

591.71	PIEZOMETRIC SURFACE ELEVATION IN FEET
—591—	CONTOUR LINE
	PROPERTY LINE
	FENCE LINE
	RAILROAD
	MONITORING WELL
	STREAM GAGE
	BUILDING

ALL UNITS IN FEET (MSL)

FIGURE 3-8

PIEZOMETRIC SURFACE MAP
SHALLOW WELLS - SEPTEMBER 27, 1991
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME: LENZ OIL
APPROVED:
DATE: 7/1/92
CHECKED:
DRAWN: MO-
REPORT: RI
PROJECT: 0252-7

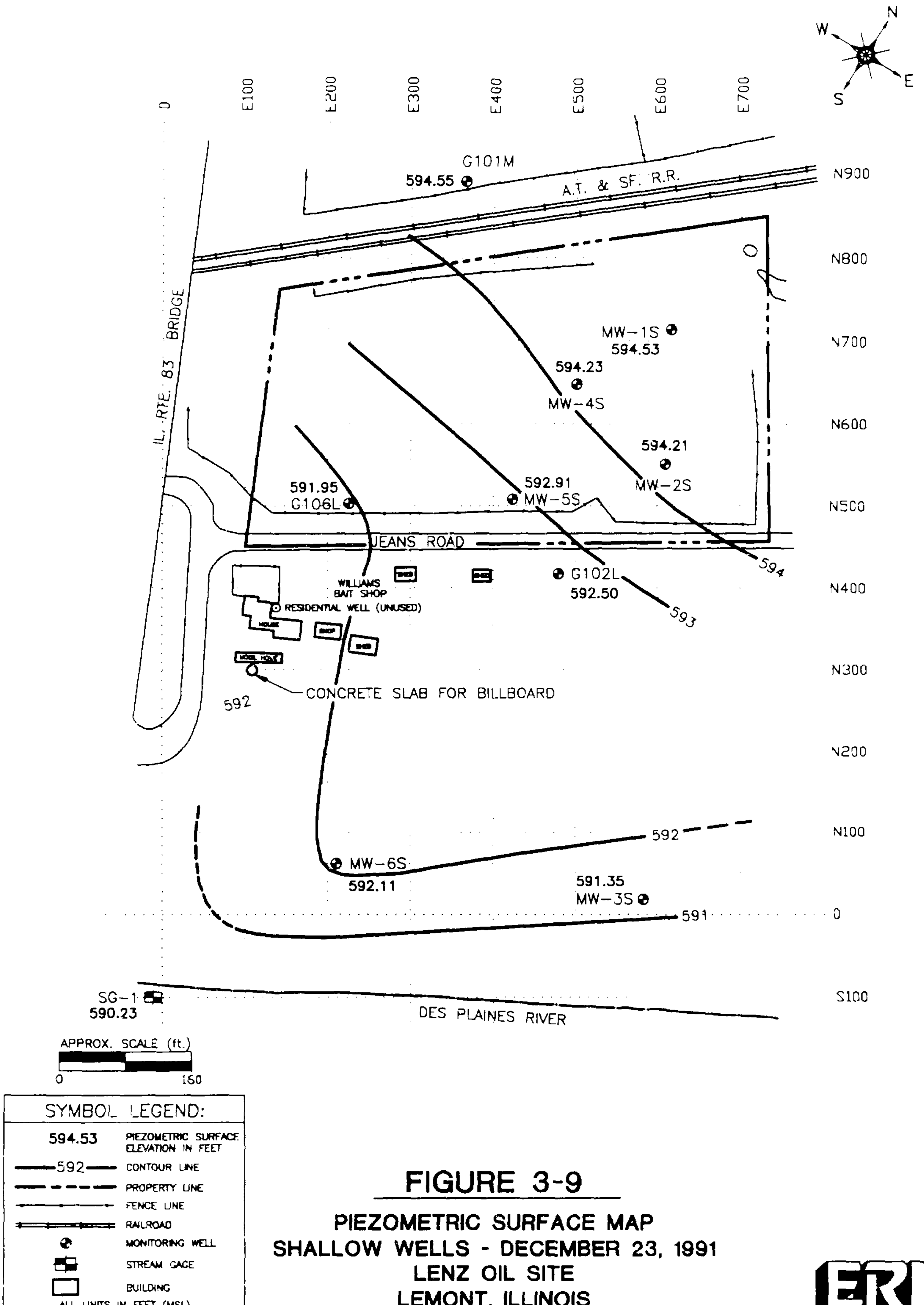


FIGURE 3-9

PIEZOMETRIC SURFACE MAP
SHALLOW WELLS - DECEMBER 23, 1991
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME: LENZ OIL | APPROVED: | DATE: 7/1/92 | CHECKED: | DRAWN: MO- | REPORT: RI | PROJECT: 0252-7

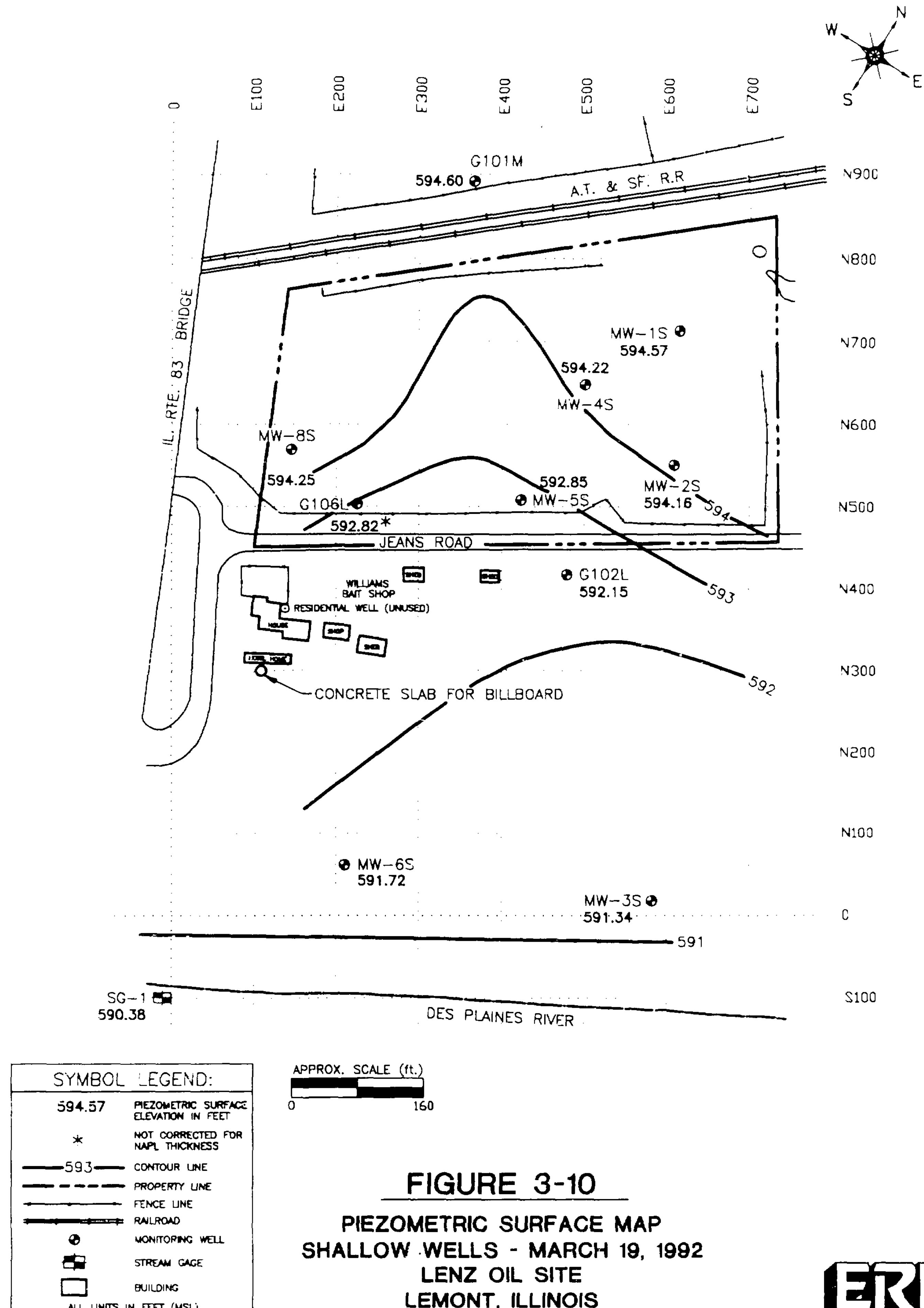
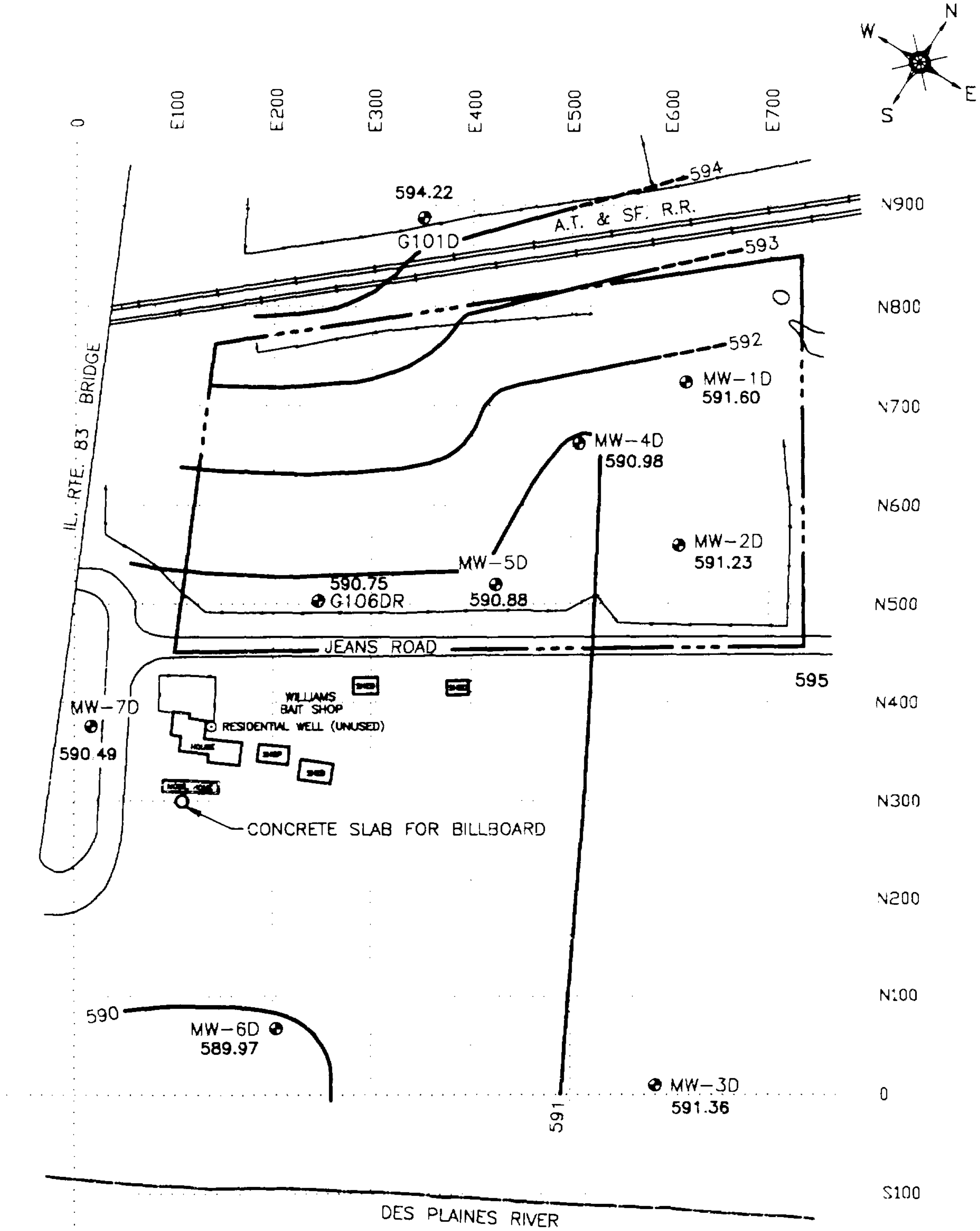


FIGURE 3-10

PIEZOMETRIC SURFACE MAP
SHALLOW WELLS - MARCH 19, 1992
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME: LENZ OIL
APPROVED:
DATE: 7/1/92
CHECKED:
DRAWN: MO-
REPORT: RI
PROJECT: 0252-7



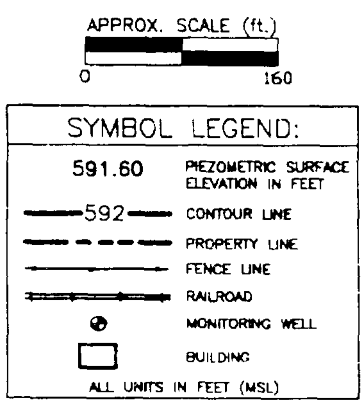


FIGURE 3-11

PIEZOMETRIC SURFACE MAP
DEEP WELLS - JUNE 24, 1991
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME: LENZ OIL
APPROVED:
DATE: 7/1/92
CHECKED:
DRAWN: MO-
REPORT: RI
PROJECT: 0252-7

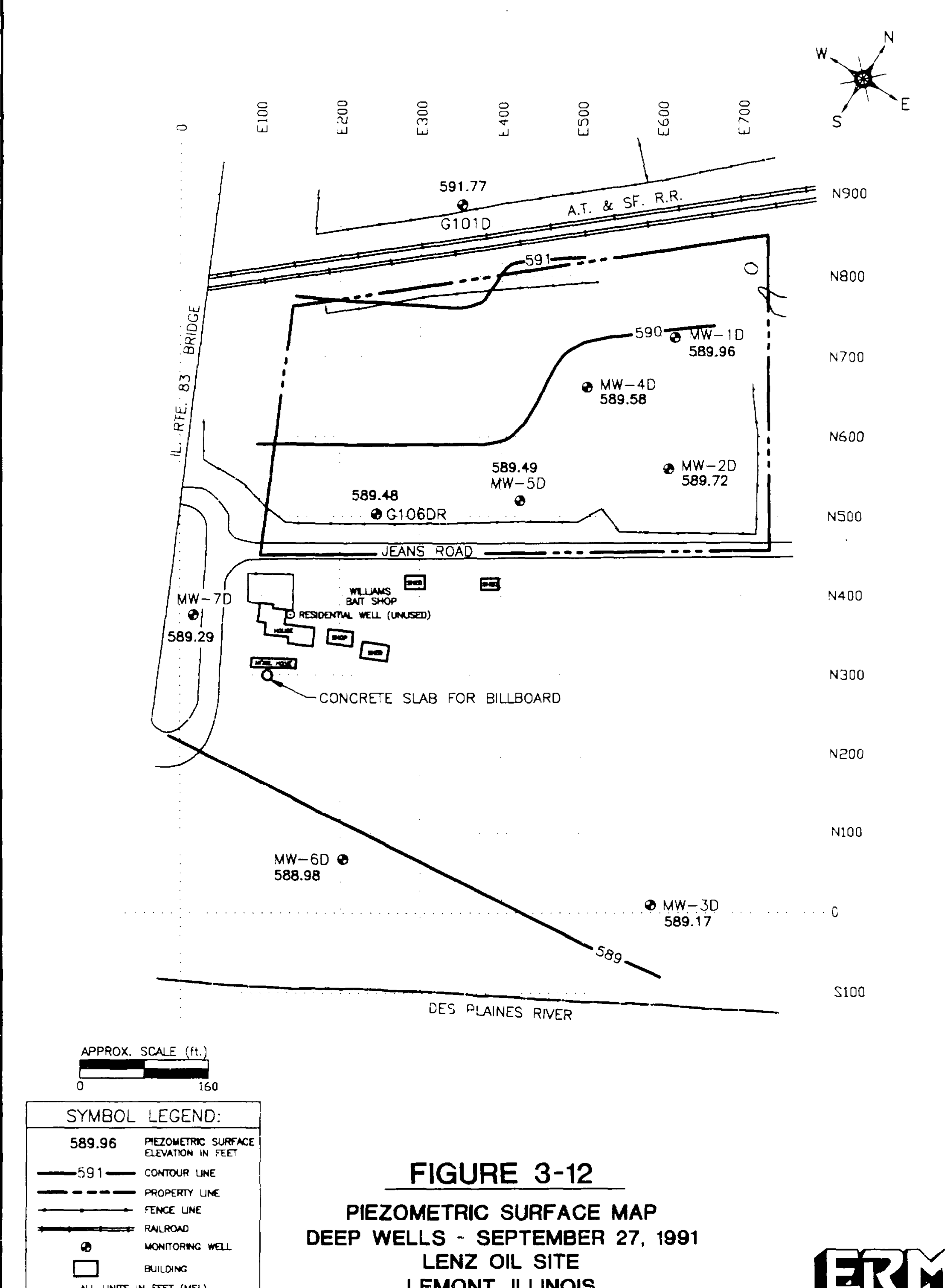
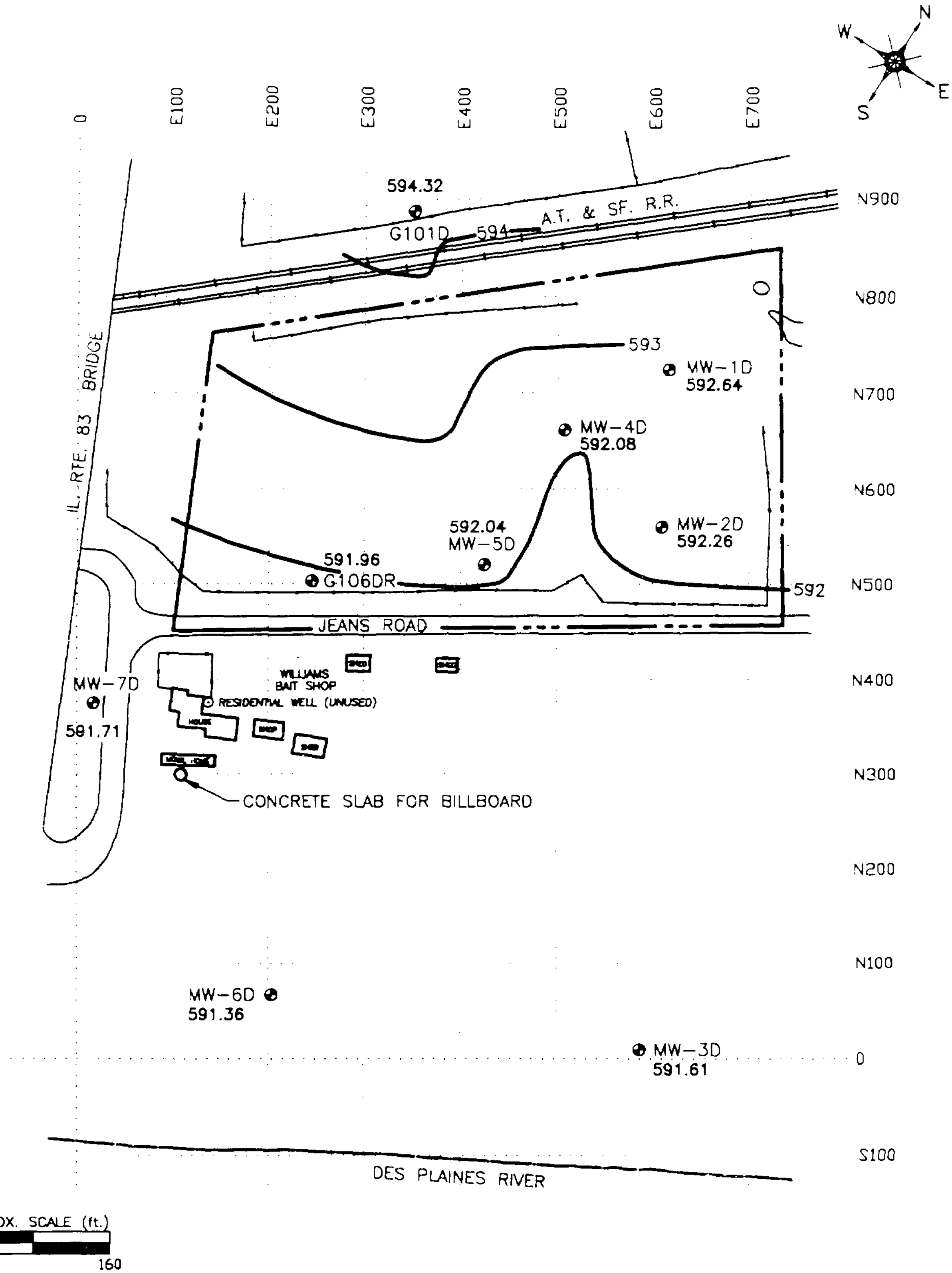


FIGURE 3-12

PIEZOMETRIC SURFACE MAP
DEEP WELLS - SEPTEMBER 27, 1991
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

CLIENT NAME LENZ OIL | APPROVED | DATE 7/1/92 | CHECKED | DRAWN MO- | REPORT RI | PROJECT 0252-7



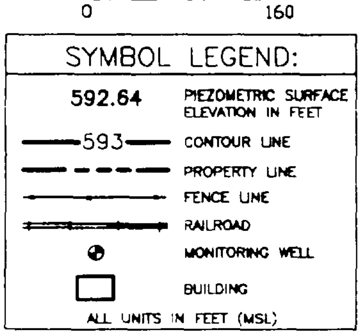
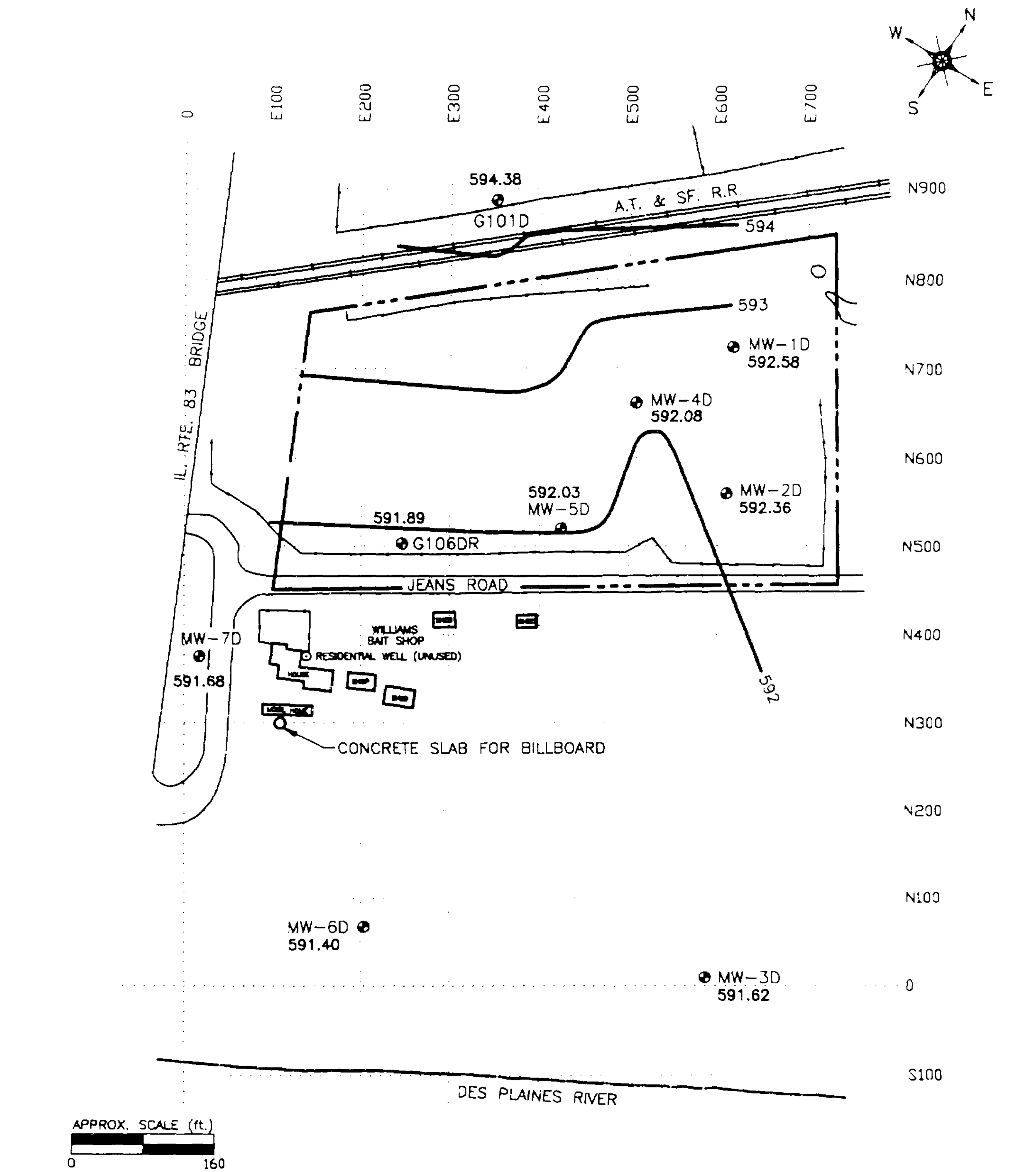


FIGURE 3-13

PIEZOMETRIC SURFACE MAP
DEEP WELLS - DECEMBER 23, 1991
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

PROJECT 0252-7
REPORT RI
DRAWN MD-
CHECKED
DATE 7/1/92
APPROVED
CLIENT NAME LENZ OIL



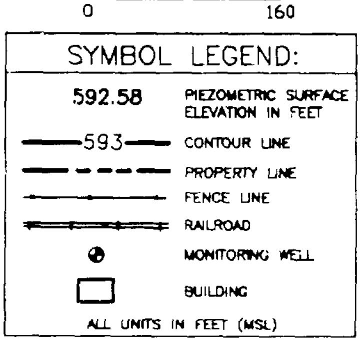


FIGURE 3-14

PIEZOMETRIC SURFACE MAP
DEEP WELLS - MARCH 19, 1992
LENZ OIL SITE
LEMONT, ILLINOIS

ERM

PROJECT: 0252-7 | REPORT: RI | DRAWN: MO- | CHECKED: | DATE: 7/15/92 | APPROVED: | CLIENT NAME: LENZ OIL

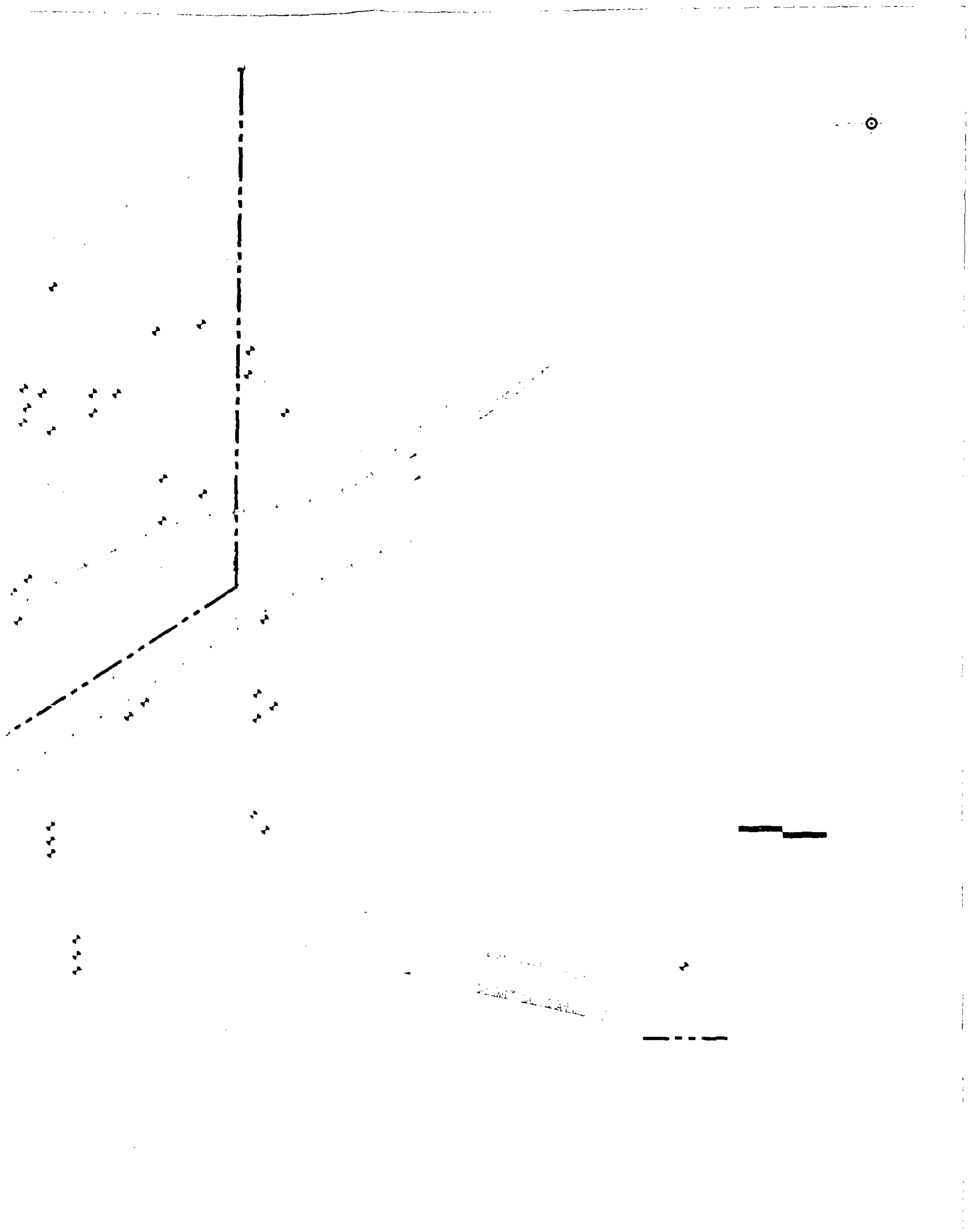
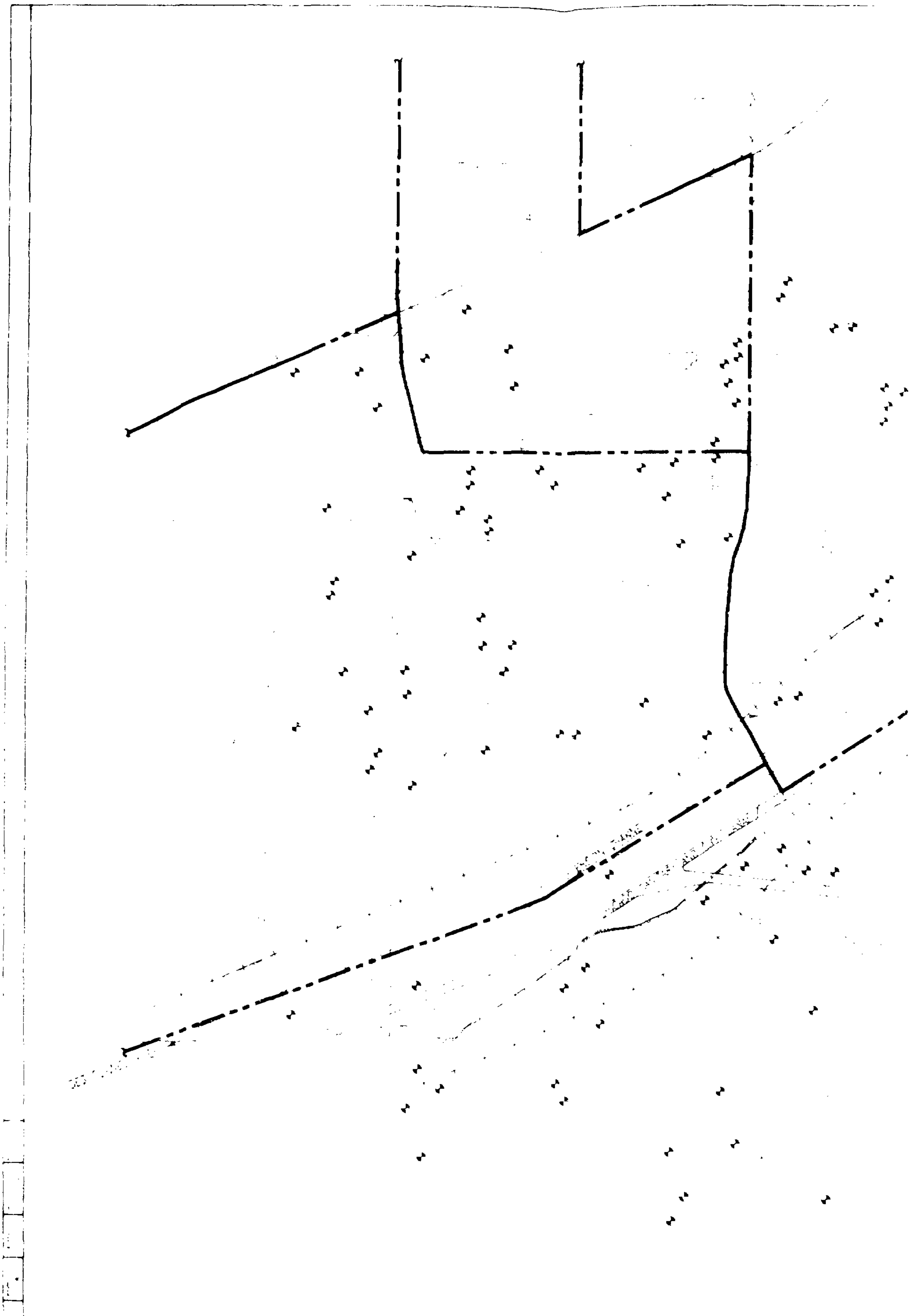
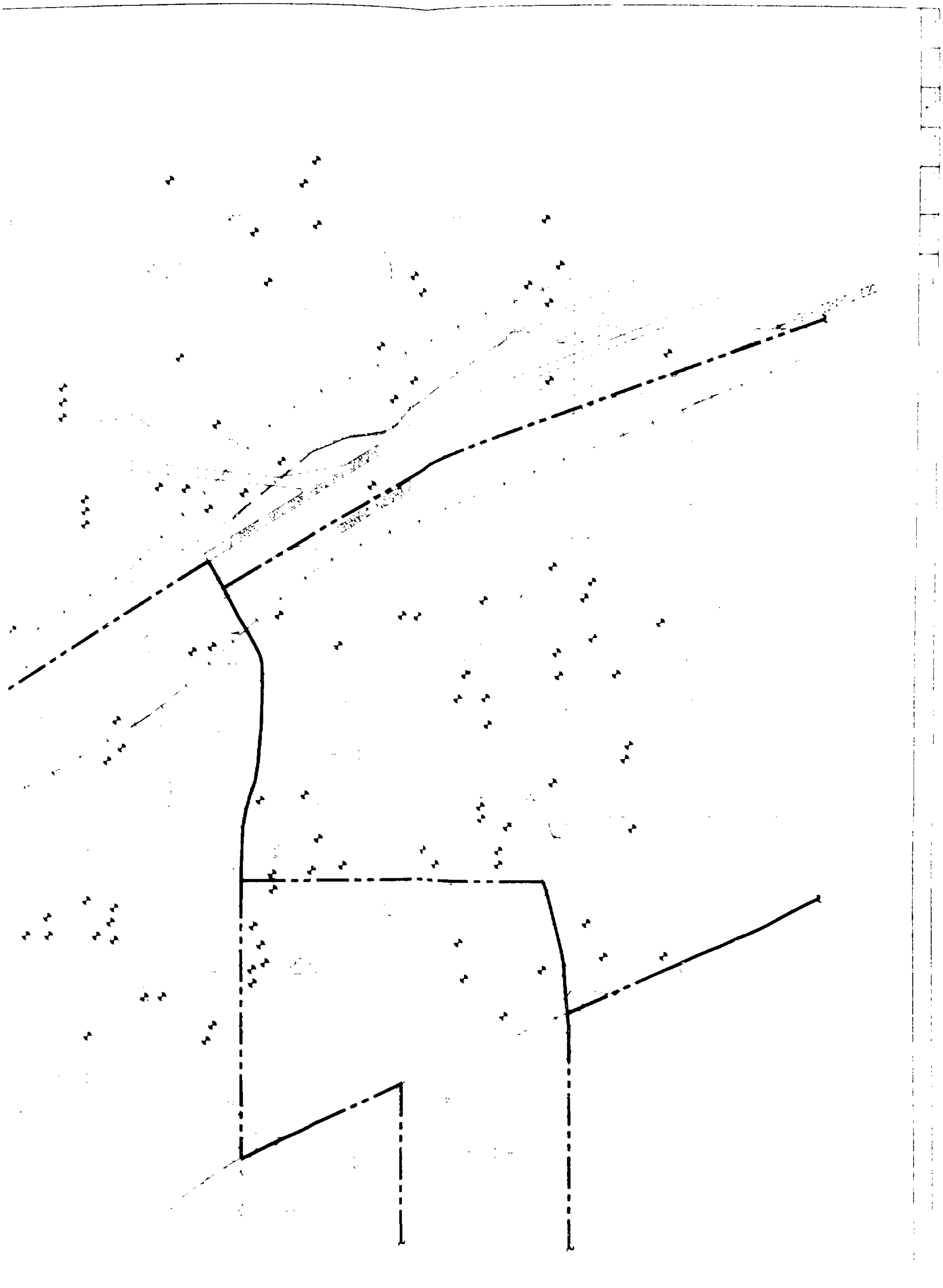


FIGURE 3-15

CENSUS TRACK AND PRIVATE
WELL LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS





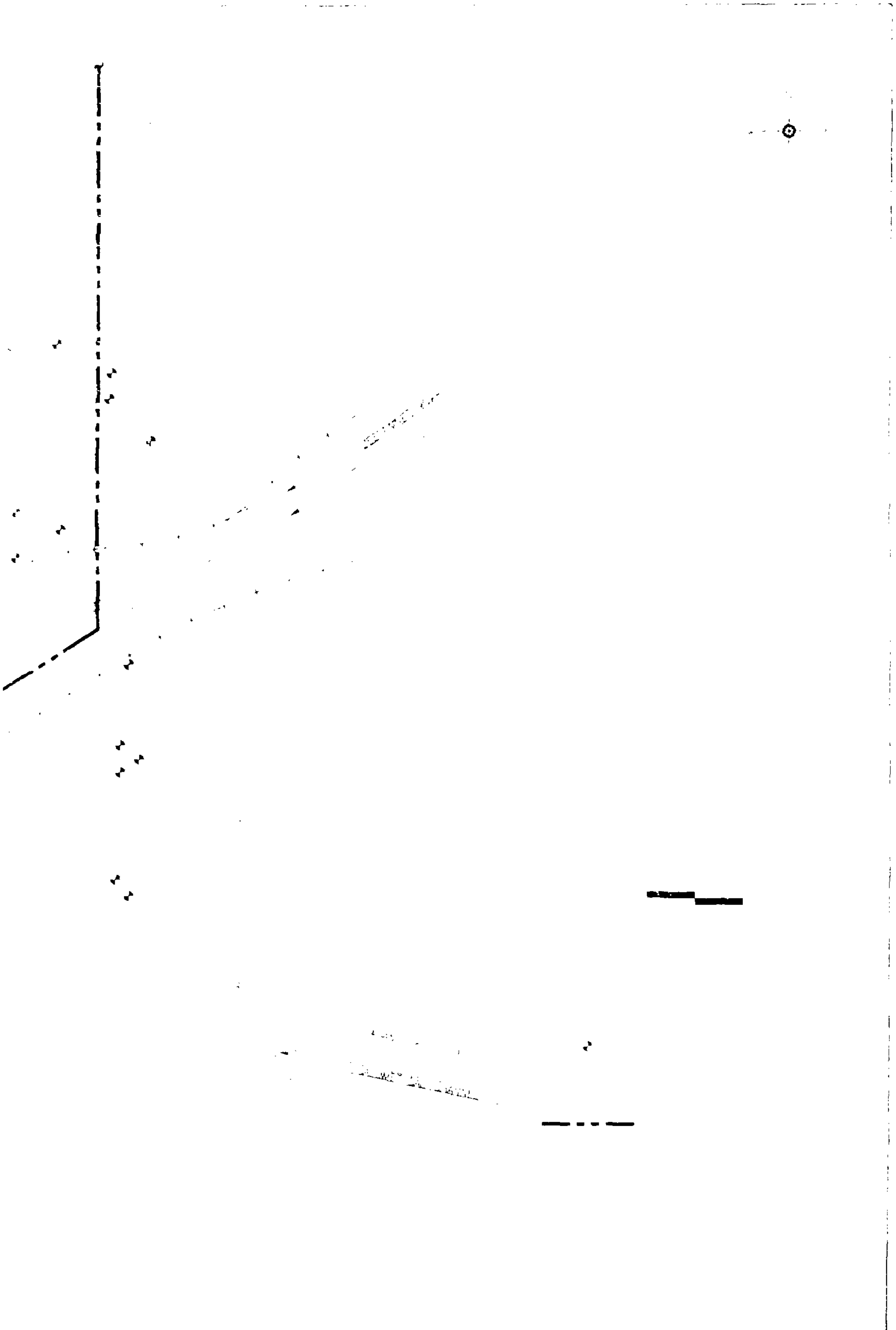


FIGURE 3-15

CENSUS TRACK AND PRIVATE
WELL LOCATION MAP
LENZ OIL SITE
LEMONT, ILLINOIS

ERM